```
Set        Items      Description
S1            56      AU=(FORREST J? OR FORREST, J?)
S2             7      COMBINATORIAL()AUCTION?
S3          2175      COLUMN(2N)(GENERATION OR TECHNIQUE? OR METHOD?)
S4          7919      (LINEAR OR INTEGER?)(2N)PROGRAM? OR HIGH?()DIMENSION?
S5             0      S3 AND AUCTION?
S6             2      S4 AND AUCTION?
S7             9      S2 OR S6
? show file
File 344:Chinese Patents Abs Aug 1985-2004/May
         (c) 2004 European Patent Office
File 347:JAPIO Nov 1976-2004/Feb(Updated 040607)
         (c) 2004 JPO & JAPIO
File 350:Derwent WPIX 1963-2004/UD,UM &UP=200441
         (c) 2004  Thomson Derwent
File 371:French Patents 1961-2002/BOPI 200209
         (c) 2002 INPI.  All rts. reserv.
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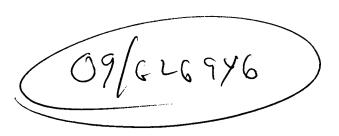
09/626946

7/5/1   (Item 1 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

016280835   **Image available**
WPI Acc No: 2004-438730/200441
Related WPI Acc No: 2001-328709; 2001-355385
XRPX Acc No: N04-347032
  **Match-making constraint constructing method for traders, involves
  constructing match-making constraint by performing logical AND operation
  on original, give-quantity, take-quantity, take-zero-sum, and
  give-zero-sum constraints**
Patent Assignee: B2E SOURCING OPTIMIZATION INC (BTWO-N)
Inventor: BRODSKY A; GOZHANSKY A; KARPISHPAN S; KATZ M; ZELIVINSKI S
Number of Countries: 001   Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6751597	B1	20040615	US 99161355	P	19991026	200441	B
			US 99163243	P	19991103		
			US 99163425	P	19991103		
			US 2000695046	A	20001025		

Priority Applications (No Type Date): US 2000695046 A 20001025; US 99161355
  P 19991026; US 99163243 P 19991103; US 99163425 P 19991103
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6751597	B1		20	G06F-017/60	Provisional application US 99161355
					Provisional application US 99163243
					Provisional application US 99163425

Abstract (Basic): US 6751597 B1
      NOVELTY - The method involves creating a quantity variable for each
of an item identified in respective all-given-item and all-take-item
specifications. Take-zero-sum and give-zero-sum constraints are
constructed based on the variables. A match-making constraint is
constructed by performing a logical AND operation on original,
give-quantity, take-quantity, take-zero-sum, and give-zero-sum
constraints in a computing device (127).
      DETAILED DESCRIPTION - The take-zero-sum constraint identifies
whether all of the items in the all-take-item specifications are
available in the all-give-item specifications. The give-zero-sum
constraint identifies whether all of the items in the all-give-item
specifications are required in the all-take-item specifications. An
INDEPENDENT CLAIM is also included for a method for forming a match
among a number of traders and for recommending an optimal trade.
      USE - Used for constructing a match-making constraint for traders
(claimed) in an electronic commerce e.g. electronic mall and shop e.g.
IMALL and Amazon.com, electronic **auction** e.g. EBAY and Yahoo, and
competitive shopping e.g. PriceLine.com using a reverse **auction** .
      ADVANTAGE - The method performs optimized match-making trading
activities in electronic commerce realm. The match-making constraints
combine the match-making and optimization processes and allows the
traders to design transactions that are optimal in terms of traders
objectives and are mutually agreeable with available trade
specifications.
      DESCRIPTION OF DRAWING(S) - The drawing shows an adaptive trade
specification (ATS) based trading software system, describing a high
level graphical summary of a suite of software tools related to the
system.
      ATS based electronic marketplace (101)
      ATS based electronic mail (103)

ATS based electronic **auction** (105)
ATS match-maker (127)
Mixed **integer** **programming** (MIP) solver (139)
pp; 20 DwgNo 1/5
Title Terms: MATCH; CONSTRAIN; CONSTRUCTION; METHOD; CONSTRUCTION; MATCH;
  CONSTRAIN; PERFORMANCE; LOGIC; OPERATE; ORIGINAL; QUANTITY; QUANTITY;
  ZERO; SUM; ZERO; SUM; CONSTRAIN
Derwent Class: T01; T05
International Patent Class (Main): G06F-017/60
File Segment: EPI

7/5/2   (Item 2 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

016187316   **Image available**
WPI Acc No: 2004-345202/200432
XRPX Acc No: N04-275882
  Combinatorial   auction **system applies several bid restrictions to bid
  received from bidder, based on composition of one or more prior bids from
  bidder**
Patent Assignee: MARKET DESIGN GROUP INC (MARK-N)
Inventor: MCAFEE R P; MILGROM P
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6718312	B1	20040406	US 99416587	A	19991012	200432	B

Priority Applications (No Type Date): US 99416587 A 19991012
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6718312	B1		18	G06F-017/60	

Abstract (Basic): US 6718312 B1
      NOVELTY - A computer applies several bid restrictions to a bid
  received from a bidder, based on the composition of one or more prior
  bids from the bidder. The bids that satisfy the restrictions are
  recorded and a selected set of recorded bids are communicated to
  several auction participants connected to the computer.
      DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
  following:
      (1) method of **combinatorial**   **auctions** with bid composition
  restrictions;
      (2) recorded medium storing program for **combinatorial**   **auctions**
  with bid composition restrictions.
      USE - For simultaneous auction of multiple items over Internet.
      ADVANTAGE - By applying bid composition restrictions the problem of
  bidding for complements can be eliminated without reducing efficiency
  of auction outcomes.
      DESCRIPTION OF DRAWING(S) - The figure shows the flowchart for
  checking bid composition restrictions.
      pp; 18 DwgNo 7/7
Title Terms: COMBINATION; AUCTION; SYSTEM; APPLY; BID; RESTRICT; BID;
  RECEIVE; BASED; COMPOSITION; ONE; MORE; PRIOR; BID
Derwent Class: T01
International Patent Class (Main): G06F-017/60
File Segment: EPI

7/5/3   (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

016045497   **Image available**
WPI Acc No: 2004-203348/200419
XRPX Acc No: N04-161765
   Winning allocation determining method for combinatorial   auction ,
   involves eliminating allocation that is not feasible and optimal, and
   selecting one of remaining allocations as winning allocation based on
   preset criteria
Patent Assignee: CONEN W (CONE-I); SANDHOLM T (SAND-I)
Inventor: CONEN W; SANDHOLM T
Number of Countries: 001 Number of Patents: 001
Patent Family:
Patent No   Kind   Date   Applicat No   Kind   Date   Week
US 20040039682 A1   20040226 US 2002371436   P   20020410 200419 B
                                US 2003412643   A   20030410

Priority Applications (No Type Date): US 2002371436 P 20020410; US
   2003412643 A 20030410
Patent Details:
Patent No   Kind Lan Pg   Main IPC   Filing Notes
US 20040039682 A1   19 G06F-017/60   Provisional application US 2002371436
Abstract (Basic): US 20040039682 A1
        NOVELTY - The method involves querying a buyer regarding a buyer
   preference about an allocation or a bundle. The buyers reply or
   intimation to the query is received. Each allocation that is not
   feasible or not optimal is eliminated from considering as winning
   allocation based on the reply. One of remaining allocations is selected
   as the winning allocation based on preset criteria.
        DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a
   computer readable medium having stored instructions.
        USE - Used for determining winning allocation in **combinatorial**
   auctions with forward and reverse auctions and exchanges.
        ADVANTAGE - The method selects one of the remaining allocations as
   the winning allocation based on the preset criteria, thereby
   determining the winners in simplified computational steps effectively.
        DESCRIPTION OF DRAWING(S) - The drawing shows an augmented order
   graph that includes a node for each bidder-bundle pair and which
   further includes the rank lattice of the possible combination of bids
   of two bidders where infeasible allocations are illustrated on a
   highlighted background.
        pp; 19 DwgNo 5/5
Title Terms: WINNING; ALLOCATE; DETERMINE; METHOD; COMBINATION; AUCTION;
   ELIMINATE; ALLOCATE; FEASIBLE; OPTIMUM; SELECT; ONE; REMAINING; WINNING;
   ALLOCATE; BASED; PRESET; CRITERIA
Derwent Class: T01; T05
International Patent Class (Main): G06F-017/60
File Segment: EPI

7/5/4   (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

015902825   **Image available**
WPI Acc No: 2004-060665/200406
Related WPI Acc No: 2004-168277
XRPX Acc No: N04-049108

Winning bids determination method in multi-unit combinatorial auction **, involves determining candidate allocation including selected bid combination and price data, for each unique path of search tree**
Patent Assignee: GILPIN A G (GILP-I); LEVINC D L (LEVI-I); SANDHOLM T (SAND-I); SURI S (SURI-I)
Inventor: GILPIN A G; LEVINC D L; SANDHOLM T; SURI S
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030225677	A1	20031204	US 2000183674	P	20000218	200406	B
			US 2001789480	A	20010220		
			US 2002371450	P	20020410		
			US 2003411879	A	20030410		

Priority Applications (No Type Date): US 2003411879 A 20030410; US 2000183674 P 20000218; US 2001789480 A 20010220; US 2002371450 P 20020410
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030225677	A1		40	G06F-017/60	Provisional application US 2000183674
					CIP of application US 2001789480
					Provisional application US 2002371450

Abstract (Basic): US 20030225677 A1
     NOVELTY - The unique paths of a search tree that is formed using selected bids, are searched to determine for each path a candidate allocation including selected bid combination and price data obtained by summing bid prices of the combinations of selected bids. When the price included in candidate allocation is better than the current price included in best allocation, the best allocation is updated with candidate allocation.
     DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for computer readable medium storing program to determine winning bids.
     USE - For determining winning bid in multi-unit **combinatorial auction**
     ADVANTAGE - The optimal combination of bids in a combinational auction, reverse auction or exchange, that has most favorable exchange of value is determined easily and efficiently.
     DESCRIPTION OF DRAWING(S) - The figure shows a flowchart explaining winning bids determination process
     pp; 40 DwgNo 2/14
Title Terms: WINNING; BID; DETERMINE; METHOD; MULTI; UNIT; COMBINATION; AUCTION; DETERMINE; CANDIDATE; ALLOCATE; SELECT; BID; COMBINATION; PRICE; DATA; UNIQUE; PATH; SEARCH; TREE
Derwent Class: T01; T05
International Patent Class (Main): G06F-017/60
File Segment: EPI

 7/5/5   (Item 5 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

015902796   **Image available**
WPI Acc No: 2004-060636/200406
XRPX Acc No: N04-049079
  Winning allocation determining method in combinatorial auction **or exchange, involves determining winning allocation based on determined clearing price for buying and selling bids that maximize clearing surplus**
Patent Assignee: SANDHOLM T (SAND-I); SURI S (SURI-I)

Inventor: SANDHOLM T; SURI S
Number of Countries: 001 Number of Patents: 001
Patent Family:
Patent No   Kind   Date   Applicat No   Kind   Date   Week
US 20030225628 A1   20031204 US 2002371390   P   20020410 200406 B
                                US 2003410876   A   20030410

Priority Applications (No Type Date): US 2002371390 P 20020410; US
  2003410876 A 20030410
Patent Details:
Patent No Kind Lan Pg   Main IPC   Filing Notes
US 20030225628 A1   16 G06F-017/60   Provisional application US 2002371390

Abstract (Basic): US 20030225628 A1
      NOVELTY - The bid that includes price quantity demand curve (2) and
supply curve are received. The received curves are utilized to
determine the clearing price for buying and selling bids that maximize
a clearing surplus. The winning allocation is determined based on the
determined clearing price.
      DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
following:
      (1) winning allocation determining method in auction;
      (2) winning allocation determining method in forward auction;
      (3) winning allocation determining method in reverse auction;
      (4) winning allocation determining method in exchange; and
      (5) computer readable medium storing winning allocation determining
program in auction, exchange, forward and reverse auction.
      USE - For determining winning allocations in **combinatorial
auctions** and exchanges.
      ADVANTAGE - The price quantity pair represented by point on the
price quantity curve determines the winning allocation reliably.
      DESCRIPTION OF DRAWING(S) - The figure shows an explanatory view of
the linear price quantity demand curve in the co-ordinate system.
      price quantity demand curve (2)
      Cartesian coordinate system (4)
      x-axis (6)
      y-axis (8)
      origin (10)
      pp; 16 DwgNo 1/6
Title Terms: WINNING; ALLOCATE; DETERMINE; METHOD; COMBINATION; AUCTION;
  EXCHANGE; DETERMINE; WINNING; ALLOCATE; BASED; DETERMINE; CLEAR; PRICE;
  BUY; SELL; BID; MAXIMISE; CLEAR; SURPLUS
Derwent Class: T01; T05
International Patent Class (Main): G06F-017/60
File Segment: EPI

 7/5/6   (Item 6 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

015341057   **Image available**
WPI Acc No: 2003-401995/200338
XRPX Acc No: N03-320623
  Bid selection method in reverse combinatorial   auction , **involves
  modeling demand constraints and minimum/maximum number of suppliers based
  on counting variables indicating selection of bids in optimal bid set**
Patent Assignee: DAVENPORT A J (DAVE-I); KALAGNANAM J R (KALA-I); LEE H S
  (LEEH-I)
Inventor: DAVENPORT A J; KALAGNANAM J R; LEE H S
Number of Countries: 001 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030033236	A1	20030213	US 2001917818	A	20010731	200338	B

Priority Applications (No Type Date): US 2001917818 A 20010731
Patent Details:

Patent No	Kind Lan Pg	Main IPC	Filing Notes
US 20030033236 A1	19	G06F-017/60	

Abstract (Basic): US 20030033236 A1
         NOVELTY - A bid decision variable and a counting variable
   indicating the selection of bids in optimal bid set, are introduced.
   Demand constraints for each item and minimum/maximum numbers of
   suppliers are modeled based on counting variables. Dummy variables are
   introduced to ensure feasible solution. An objective of choosing bids
   arriving early is formulated for given cost, based on additional time
   stamped objective.
         USE - For selecting bid in multi-bid reverse **combinatorial
   auction** .
         ADVANTAGE - Enables to find the optimal cost minimizing bid set
   when commodities are offered in bundles, automatically.
         DESCRIPTION OF DRAWING(S) - The figure shows an architecture for an
   auction or a request-for-quote system.
         pp; 19 DwgNo 1/10
Title Terms: BID; SELECT; METHOD; REVERSE; COMBINATION; AUCTION; DEMAND;
   CONSTRAIN; MINIMUM; MAXIMUM; NUMBER; SUPPLY; BASED; COUNT; VARIABLE;
   INDICATE; SELECT; BID; OPTIMUM; BID; SET
Derwent Class: T01; T05
International Patent Class (Main): G06F-017/60
File Segment: EPI

 7/5/7   (Item 7 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

015319465   **Image available**
WPI Acc No: 2003-380400/200336
Related WPI Acc No: 2004-121278
XRPX Acc No: N03-303803
   Computer-implemented combinatorial   auction **method for broadcast
   spectrum rights, involves constructing neighboring allocation by
   reallocating within current allocation goods from one bid to another bid**
Patent Assignee: COMBINENET INC (COMB-N)
Inventor: BOUTILIER C E; HOOS H H
Number of Countries: 031 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030028475	A1	20030206	US 2001310001	P	20010803	200336	B
			US 2002211771	A	20020802		
EP 1286274	A2	20030226	EP 200278167	A	20020802	200336	

Priority Applications (No Type Date): US 2001310001 P 20010803; US
   2002211771 A 20020802
Patent Details:

Patent No	Kind Lan Pg	Main IPC	Filing Notes
US 20030028475 A1	14	G06F-017/60	Provisional application US 2001310001
EP 1286274	A2 E	G06F-017/10	

   Designated States (Regional): AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
   GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR

Abstract (Basic): US 20030028475 A1
    NOVELTY - Several bids, each having several sub-bids and Boolean
operators logically connecting the sub-bids, are received. A best
allocation is initialized with the current allocation of the bids. A
neighboring allocation is constructed by reallocating within current
allocation goods from one bid to another bid. The best allocation is
updated, if the neighboring allocation value is greater than that of
current allocation.
    DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the
following:
    (1) computer readable medium storing **combinatorial   auction**
program; and
    (2) method for finding a high quality allocation of bids in
combinatorial   auction .
    USE - For **combinatorial   auction** for broadcast spectrum rights,
airport gate allocations, etc.
    ADVANTAGE - By reallocating goods between bids, a series of
neighboring allocations can be constructed and their values can be
determined, so as to determine a high quality, perhaps optimal,
allocation of bids in a **combinatorial   auction** .
    DESCRIPTION OF DRAWING(S) - The figure shows a flowchart
illustrating the computer-implemented **combinatorial   auction**
procedure.
    pp; 14 DwgNo 3/7
Title Terms: COMPUTER; IMPLEMENT; COMBINATION; AUCTION; METHOD; BROADCAST;
  SPECTRUM; CONSTRUCTION; NEIGHBOURING; ALLOCATE; CURRENT; ALLOCATE; GOODS;
  ONE; BID; BID
Derwent Class: T01
International Patent Class (Main): G06F-017/10; G06F-017/60
File Segment: EPI

 7/5/8   (Item 8 from file: 350)
DIALOG(R)File 350:Derwent WPIX
(c) 2004 Thomson Derwent. All rts. reserv.

014678331   **Image available**
WPI Acc No: 2002-499388/200253
XRPX Acc No: N02-395381
  Winning bid selection method for combinatorial   auction **, involves**
  selecting neighboring allocation based on random distribution or
  heuristic value when current allocation has no common bids
Patent Assignee: BOUTILIER C E (BOUT-I); HOOS H H (HOOS-I)
Inventor: BOUTILIER C E; HOOS H H
Number of Countries: 001 Number of Patents: 001
Patent Family:
Patent No   Kind Date   Applicat No   Kind   Date   Week
US 20020052829 A1   20020502 US 2000221551 A   20000728 200253 B
                               US 2001918164 A   20010730

Priority Applications (No Type Date): US 2000221551 P 20000728; US
  2001918164 A 20010730
Patent Details:
Patent No   Kind Lan Pg   Main IPC   Filing Notes
US 20020052829 A1   10 G06F-017/60   Provisional application US 2000221551

Abstract (Basic): US 20020052829 A1
    NOVELTY - A subset of bids is designated as current allocation.
    When current allocation has no bids in common, a neighboring allocation

including a new bid and current allocation is determined based on
random distribution or heuristic value. The best allocation is updated
with current allocation, if the sum of bid values of current allocation
is greater than that of best allocation.
     USE - For selecting winning bid in **combinatorial   auction** used
for determining resource allocations.
     ADVANTAGE - Provides the maximum profit to the auctioneer or
seller. Probabilistic function and heuristic values jointly offer the
best allocation to the seller.
     DESCRIPTION OF DRAWING(S) - The figure shows a flowchart of the
method of selecting the winning bids.
     pp; 10 DwgNo 3/3
Title Terms: WINNING; BID; SELECT; METHOD; COMBINATION; AUCTION; SELECT;
   NEIGHBOURING; ALLOCATE; BASED; RANDOM; DISTRIBUTE; HEURISTIC; VALUE;
   CURRENT; ALLOCATE; NO; COMMON; BID
Derwent Class: T01
International Patent Class (Main): G06F-017/60
File Segment: EPI

 7/5/9   (Item 9 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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014132118   **Image available**
WPI Acc No: 2001-616329/200171
XRPX Acc No: N01-459748
   **Price optimization method for computerized market place, involves
   selecting unique pair of buyers and sellers having maximum utility and
   calculating optimal allocation of total utility**
Patent Assignee: I2 TECHNOLOGIES INC (ITWO-N); SCHMIDT C (SCHM-I)
Inventor: SCHMIDT C W; SCHMIDT C
Number of Countries: 095 Number of Patents: 005
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
WO 200169494	A1	20010920	WO 2001US7847	A	20010312	200171	B
US 20010047323	A1	20011129	US 2000188974	P	20000313	200202	
			US 2001820370	A	20010311		
AU 200145630	A	20010924	AU 200145630	A	20010312	200208	
DE 10195930	T	20030508	DE 1095930	A	20010312	200338	
			WO 2001US7847	A	20010312		
TW 511020	A	20021121	TW 2001105812	A	20010402	200353	

Priority Applications (No Type Date): US 2001820370 A 20010311; US
   2000188974 P 20000313
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 200169494	A1	E	30	G06F-017/60	

   Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA
   CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP
   KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT
   RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
   Designated States (Regional): AT BE CH CY DE DK EA ES FI FR GB GH GM GR
   IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW

US 20010047323	A1			G06F-017/60	Provisional application US 2000188974
AU 200145630	A			G06F-017/60	Based on patent WO 200169494
DE 10195930	T			G06F-017/60	Based on patent WO 200169494
TW 511020	A			G06F-017/60	

Abstract (Basic): WO 200169494 A1

NOVELTY - A unique pair of buyers and sellers having maximum total utility are selected. The optimal allocations of the total utility are calculated for each buyer and seller, stably, such that transaction price for allocating the utility between selected seller and buyer is determined.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for buyer and seller matching system.

USE - For optimizing price in computerized market place.

ADVANTAGE - The **linear programming** solver applied to the constraints related to buyers and sellers provides optimal matching and pairings, thereby differentiating between different products available in single market place. Allows both buyers and sellers to include non-price related factors in the market by adjusting their reserve prices for preferred pairings.

DESCRIPTION OF DRAWING(S) - The figure shows the **auction** .

pp; 30 DwgNo 1/16

Title Terms: PRICE; OPTIMUM; METHOD; COMPUTER; MARKET; PLACE; SELECT; UNIQUE; PAIR; BUY; MAXIMUM; UTILISE; CALCULATE; OPTIMUM; ALLOCATE; TOTAL; UTILISE

Derwent Class: T01

International Patent Class (Main): G06F-017/60

File Segment: EPI

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Set       Items     Description
S1          344     AU=(FORREST J? OR FORREST, J?)
S2          166     COMBINATORIAL()AUCTION?
S3         2080     COLUMN(2N)(GENERATION OR TECHNIQUE? OR METHOD?)
S4        39055     (LINEAR OR INTEGER?)(2N)PROGRAM? OR HIGH?()DIMENSION?
S5            0     S2 AND S3
S6           11     S2 AND S4
? show file
File    2:INSPEC 1969-2004/Jun W3
           (c) 2004 Institution of Electrical Engineers
File   35:Dissertation Abs Online 1861-2004/May
           (c) 2004 ProQuest Info&Learning
File   65:Inside Conferences 1993-2004/Jun W4
           (c) 2004 BLDSC all rts. reserv.
File   99:Wilson Appl. Sci & Tech Abs 1983-2004/Jun
           (c) 2004 The HW Wilson Co.
File 233:Internet & Personal Comp. Abs. 1981-2003/Sep
           (c) 2003 EBSCO Pub.
File 474:New York Times Abs 1969-2004/Jul 01
           (c) 2004 The New York Times
File 475:Wall Street Journal Abs 1973-2004/Jul 01
           (c) 2004 The New York Times
File 583:Gale Group Globalbase(TM) 1986-2002/Dec 13
           (c) 2002 The Gale Group
File 256:SoftBase:Reviews,Companies&Prods. 82-2004/May
           (c)2004 Info.Sources Inc
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6/5/1   **(Item 1 from file: 2)**

7716011   INSPEC Abstract Number: C2003-10-7120-002
  Title: Combinatorial   auctions , **an example of algorithm theory in real life**

  Author(s): Andersson, A.
  Author Affiliation: Dept. of Comput. Sci., Uppsala Univ., Sweden
  Book Title: Computer science in perspective. Essays dedicated to Thomas Ottmann   p.13-21
  Editor(s): Klein, R.; Six, H-W.; Wegner, L.
  Publisher: Springer-Verlag, Berlin, Germany
  Publication Date: 2003 Country of Publication: Germany   x+355 pp.
  ISBN: 3 540 00579 X   Material Identity Number: XB-2003-00022
  Language: English   Document Type: Book Chapter (BC)
  Treatment: Applications (A); Practical (P); Theoretical (T)

  Abstract: We   discuss **combinatorial**   **auctions** , an interesting interdisciplinary research field in computer science and economics. In particular, we (a) describe a set of real-world cases, (b) how to solve the associated computational problems, and (c) discuss the impact of the probability distributions chosen for benchmarking. (16 Refs)
  Subfile: C
  Descriptors: commerce; computational complexity; **integer programming** ; probability
  Identifiers: **combinatorial auctions** ; algorithm theory; computer science; economics; probability distributions; **integer programming** problem; public procurement; road painting; paper material; regional procurement; power exchanges
  Class Codes: C7120 (Financial computing); C1180 (Optimisation techniques); C1140Z (Other topics in statistics); C4240C (Computational complexity)

6/5/2   **(Item 2 from file: 2)**

7707846   INSPEC Abstract Number: C2003-09-7120-038
  Title: **Price-based information certificates for minimal-revelation** combinatorial   auctions

  Author(s): Parkes, D.C.
  Author Affiliation: Div. of Eng. & Appl. Sci., Harvard Univ., MA, USA
  Conference   Title: Agent-Mediated Electronic Commerce IV. Designing Mechanisms and Systems. AAMAS 202 Workshop on Agent-Mediated Electronic Commerce. Revised Papers (Lecture Notes in Artificial Intelligence Vol.2531)   p.103-22
  Editor(s): Padget, J.; Shehory, O.; Parkes, D.; Sadeh, N.; Walsh, W.E.
  Publisher: Springer-Verlag, Berlin, Germany
  Publication Date: 2002 Country of Publication: Germany   xvii+339 pp.
  ISBN: 3 540 00327 4   Material Identity Number: XX-2003-00186
  Conference   Title: Agent-Mediated Electronic Commerce IV. Designing Mechanisms and Systems. AAMAS 2002 Workshop on Agent-Mediated Electronic Electronic Commerce. Revised Papers
  Conference Date: 16 July 2002   Conference Location: Bologna, Italy
  Language: English   Document Type: Conference Paper (PA)
  Treatment: Practical (P); Theoretical (T)

  Abstract: The equilibrium of the direct-revelation Vickrey-Clarke-Groves (VCG) mechanism for **combinatorial auctions** requires every agent to

provide complete information about its preferences. Not only is this unreasonable in settings with costly preference evaluation, but moreover it is often possible to implement the same outcome with incomplete preference information. We formalize the problem of minimal-revelation mechanism design and introduce the concept of minimal information certificates. **Linear programming** duality theory proves that a class of price-based information certificates are both necessary and sufficient to compute an efficient allocation in a dominant strategy mechanism. (37 Refs)

Subfile: C

Descriptors: costing; economics; electronic commerce; **linear programming** ; multi-agent systems; software agents

Identifiers: price-based information certificates; minimal-revelation **combinatorial auctions** ; agent preferences; preference evaluation; minimal information certificates; e commerce; **linear programming** duality theory

Class Codes: C7120 (Financial computing); C7180 (Retailing and distribution computing); C6170 (Expert systems and other AI software and techniques); C1230 (Artificial intelligence); C1290D (Systems theory applications in economics and business); C1180 (Optimisation techniques)

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6/5/3   (Item 3 from file: 2)

7707841   INSPEC Abstract Number: C2003-09-7120-033

Title: Bidtree ordering in IDA* combinatorial auction **winner-determination with side constraints**

Author(s): Collins, J.; Demir, G.; Gini, M.

Author Affiliation: Dept. of Comput. Sci. & Eng., Minnesota Univ., Minneapolis, MN, USA

Conference Title: Agent-Mediated Electronic Commerce IV. Designing Mechanisms and Systems. AAMAS 202 Workshop on Agent-Mediated Electronic Commerce. Revised Papers (Lecture Notes in Artificial Intelligence Vol.2531) p.17-33

Editor(s): Padget, J.; Shehory, O.; Parkes, D.; Sadeh, N.; Walsh, W.E.

Publisher: Springer-Verlag, Berlin, Germany

Publication Date: 2002 Country of Publication: Germany   xvii+339 pp.

ISBN: 3 540 00327 4   Material Identity Number: XX-2003-00186

Conference Title: Agent-Mediated Electronic Commerce IV. Designing Mechanisms and Systems. AAMAS 2002 Workshop on Agent-Mediated Electronic Electronic Commerce. Revised Papers

Conference Date: 16 July 2002   Conference Location: Bologna, Italy

Language: English   Document Type: Conference Paper (PA)

Treatment: Practical (P); Theoretical (T)

Abstract: We extend Sandholm's (2001) bidtree-based IDA* algorithm for **combinatorial auction** winner determination to deal with negotiation over tasks with precedence constraints. We evaluate its performance, and show that the order of items in the bidtree has a major impact on performance. Specifically, performance is enhanced if the items with the largest numbers of bids are at the top of the bidtree. This is due to the fact that the effective branching factor in the search tree is controlled by the number of bids returned from a query to the bidtree, which in turn is strongly related to its construction. (17 Refs)

Subfile: C

Descriptors: economics; electronic commerce; **integer programming** ; multi-agent systems; tree searching

Identifiers: bidtree ordering; **combinatorial auction** winner-determination; side constraints; IDA algorithm; negotiation;

precedence constraints; MAGNET; e commerce; Multi-Agent Negotiation Testbed
; performance; branching factor; search tree
   Class Codes: C7120 (Financial computing); C7180 (Retailing and
distribution computing); C6170 (Expert systems and other AI software and
techniques); C1230 (Artificial intelligence); C1180 (Optimisation
techniques)
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   6/5/4   (Item 4 from file: 2)
DIALOG(R)File   2:INSPEC
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7533997   INSPEC Abstract Number: C2003-03-7120-050
   Title: **An efficient approximate allocation algorithm for** combinatorial
auctions
   Author(s): Zurel, E.; Nisan, N.
   Author Affiliation: Inst. of Comput. Sci., Hebrew Univ., Jerusalem,
Israel
   Conference Title: EC'01. Proceedings of the 3rd ACM Conference on
Electronic Commerce   p.125-36
   Publisher: ACM, New York, NY, USA
   Publication Date: 2001 Country of Publication: USA   x+268 pp.
   ISBN: 1 58113 387 1   Material Identity Number: XX-2002-00479
   U.S. Copyright Clearance Center Code: 1-58113-387-1/01/0010...$5.00
   Conference Title: Proceedings of EC'01. Third ACM Conference on
Electronic Commerce
   Conference Sponsor: ACM
   Conference Date: 14-17 Oct. 2001   Conference Location: Tampa, FL, USA
   Language: English   Document Type: Conference Paper (PA)
   Treatment: Theoretical (T)

   Abstract: We propose a heuristic for allocation in **combinatorial
auctions** . We first run an approximation algorithm on the **linear
programming** relaxation of the **combinatorial auction** . We then run a
sequence of greedy algorithms, starting with the order on the bids
determined by the approximate **linear program** and continuing in a
hill-climbing fashion using local improvements in the order of bids. We
have implemented the algorithm and have tested it on the complete corpus of
instances provided by Vohra and de Vries (2000) as well as on instances
drawn from the distributions of Leyton-Brown et al. (2000). Our algorithm
typically runs two to three orders of magnitude faster than the reported
running times of Vohra and de Vries, while achieving an average
approximation error of less than 1%. This algorithm can provide, in less
than a minute of CPU time, excellent solutions for problems with over 1000
items and 10,000 bids. We thus believe that **combinatorial auctions** for
most purposes face no practical computational hurdles. (14 Refs)
   Subfile: C
   Descriptors: computational complexity; electronic commerce; **linear
programming**
   Identifiers: efficient approximate allocation algorithm; **combinatorial
auctions** ; heuristic; **linear programming** relaxation; greedy algorithms;
bids; hill climbing; average approximation error; running times
   Class Codes: C7120 (Financial computing); C4240C (Computational
complexity); C1180 (Optimisation techniques)
   Copyright 2003, IEE

   6/5/5   (Item 5 from file: 2)
DIALOG(R)File   2:INSPEC
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                     Bode Akintola02-Jul-04

7073922   INSPEC Abstract Number: C2001-12-1290D-038
 Title: Bidding and allocation in combinatorial   auctions
  Author(s): Nisan, N.
  Author Affiliation: Inst. of Comput. Sci., Hebrew Univ., Jerusalem, Israel
  Conference Title: EC'00. Proceedings of the 2nd ACM Conference on Electronic Commerce   p.1-12
  Publisher: ACM, New York, NY, USA
  Publication Date: 2000 Country of Publication: USA   vii+271 pp.
  ISBN: 1 58113 272 7   Material Identity Number: XX-2000-02428
  U.S. Copyright Clearance Center Code: 1 58113 272 7/2000/0010..$5.00
  Conference Title: Proceedings of ACM Conference on Electronic Commerce (EC-00)
  Conference Sponsor: ACM
  Conference Date: 17-20 Oct. 2000   Conference Location: Minneapolis, MN, USA
  Language: English   Document Type: Conference Paper (PA)
  Treatment: Economic aspects (E); Practical (P); Theoretical (T)

  Abstract: When an auction of multiple items is performed, it is often desirable to allow bids on combinations of items, as opposed to only on single items. Such an auction is often called "combinatorial". And the exponential number of possible combinations results in computational intractability of many aspects regarding such an auction. This paper considers two of these aspects: the bidding language and the allocation algorithm. First we consider which kinds of bids on combinations are allowed and how, ie, in what language, they are specified. The basic tradeoff is the expressibility of the language versus its simplicity. We consider and formalize several bidding languages and compare their strengths. We prove exponential separations between the expressive power of different languages, and show that one language, "OR-bids with phantom items", can polynomially simulate the others. We then consider the problem of determining the best allocation - a problem known to be computationally intractable. We suggest an approach based on **linear programming** (LP) and motivate it. We prove that the LP approach finds an optimal allocation if and only if prices can be attached to single items in the auction. We pinpoint several classes of auctions where this is the case, and suggest greedy and branch-and-bound heuristics based on LP for other cases. (29 Refs)
  Subfile: C
  Descriptors: combinatorial mathematics; costing; electronic commerce; formal languages; **linear programming** ; tree searching
  Identifiers: **combinatorial auctions** ; computational intractability; bidding language; allocation algorithm; language expressibility; language simplicity; formal language; exponential separations; OR-bids with phantom items; **linear programming** ; LP; optimal allocation; prices; greedy heuristics; branch-and-bound heuristics
  Class Codes: C1290D (Systems theory applications in economics and business); C7120 (Financial computing); C1160 (Combinatorial mathematics) ; C1180 (Optimisation techniques)
  Copyright 2001, IEE

 6/5/6   (Item 6 from file: 2)
DIALOG(R)File   2:INSPEC

6671202 / INSPEC Abstract Number: C2000-09-1290-020
  Title: Integer programming **for** combinatorial auction **winner determination**
  Author(s): Andersson, A.; Tenhunen, M.; Ygge, F.

                        Bode Akintola02-Jul-04

Abstract: **Combinatorial auctions** are important as they enable bidders to place bids on combinations of items. Compared to other auction mechanisms, they often increase the efficiency of the auction, while keeping low risks for bidders. However, the determination of an optimal winner combination in **combinatorial auctions** is a complex computational problem. In this paper we: 1) compare recent algorithms for winner determination to traditional algorithms; 2) present and benchmark a mixed **integer programming** approach to the problem, which enables very general auctions to be treated efficiently by standard **integer programming** algorithms (and hereby also by commercially available software); and 3) discuss the impact of the probability distributions chosen for benchmarking. (10 Refs)
Subfile: C
Descriptors: **integer programming** ; mathematics computing; operations research; probability
Identifiers: **combinatorial auction** ; bidders; optimal winner; **integer programming** ; probability distribution
Class Codes: C1290 (Applications of systems theory); C7310 (Mathematics computing); C1180 (Optimisation techniques); C1140Z (Other topics in statistics)

6/5/7   (Item 1 from file: 35)

01906535 ORDER NO: AADAA-I3064690
Combinatorial double auctions and business-to-business electronic commerce
Author: Xia, Mu
Degree: Ph.D.
Year: 2001
Corporate Source/Institution: The University of Texas at Austin (0227)
Supervisor: Andrew B. Whinston
Source: VOLUME 63/09-A OF DISSERTATION ABSTRACTS INTERNATIONAL.
          PAGE 3262. 119 PAGES
Descriptors: BUSINESS ADMINISTRATION, MANAGEMENT
Descriptor Codes: 0454
ISBN: 0-493-83734-5

    The Internet has changed not only the way people live, but also the way firms do business with one another. While everyone is convinced that business-to-business electronic commerce (B2B) will bring unprecedented efficiency and even open up a whole new horizon for all participating firms, the recent downturn most B2B companies suffered from clearly reflects doubts and misunderstandings of the new economy. Nevertheless,

people have come to realize the importance of economic forces over technology. The need for rigorous research on the economics of B2B, and business models in particular, is recognized by many people.

This dissertation starts with an overview of the current business models adopted by different e-marketplaces and discusses the advantages and disadvantages of each model. I analyze the roles of the intermediaries in each of these models and why some of the models did not get widely adopted. I also identify issues in B2B that are ripe for research using economic modeling and analysis. In particular, the possibility of trading in one location on the Internet has enabled the market to hold auctions to maximize the trading surplus. However auctions for direct input procurement have to take into account the possible complementarities among different components. One has to offer **combinatorial auctions** for bidders to express such complementarities in the bidding. The first challenge of holding such auctions is the Winner Determination Problem. We model the combinatorial double auction problem as an **integer programming** problem and transform it to a set packing problem. It is an NP-hard problem that can be solved by optimization (**Integer Programming**) and artificial intelligence approach (intelligent searches). We compare the two approaches both theoretically and experimentally and found the optimization approach is superior to the intelligent search approach. After the winning bids are determined, pricing them is another challenge, due to the indivisibility of the commodities. The existing pricing approaches can be grouped in two categories: bundle pricing and individual item pricing. We discuss the advantages and disadvantages of the existing approaches and find there are strong relationships among different approaches.

6/5/8   (Item 2 from file: 35)
DIALOG(R)File   35:Dissertation Abs Online
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01895395   ORDER NO: AADAA-I3056308
Solving combinatorial   auctions **with temporal constraints in economic agents**
  Author: Collins, John Edgar
  Degree: Ph.D.
  Year: 2002
  Corporate Source/Institution: University of Minnesota (0130)
  Adviser: Maria L. Gini
  Source: VOLUME 63/06-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
        PAGE 2896. 158 PAGES
  Descriptors: COMPUTER SCIENCE ; ECONOMICS, COMMERCE-BUSINESS
  Descriptor Codes: 0984; 0505
  ISBN: 0-493-71205-4

    We consider the problem of self-interested economic agents who must negotiate with each other to carry out their plans. Customer agents express plans in the form of task networks, which they offer in a marketplace in a request for quotations (RFQ). The market runs a combinatorial reverse auction, in which supplier agents submit bids that specify prices for combinations of tasks, along with time windows and duration data that the customer uses to compose a work schedule. The presence of temporal and precedence constraints among the items at auction requires extensions to the standard winner-determination procedures for **combinatorial auctions** , and the use of the enhanced winner-determination procedure in real-time negotiation requires that we predict its runtime when planning the negotiation process.
    We describe the high-level design of an agent that can act as a customer in this environment, and describe the decision behaviors such an agent must implement to maximize its utility. One of the primary decisions

such an agent must make is to determine the winners of its auctions.
Methods for the determination of auction winners are explored in detail,
and three different algorithms are presented. One is an **Integer
Programming** (IP) model, the second is a queue-based Simulated Annealing
(SA) design, and the third is an extension of the bidtree-based
Iterative-Deepening A* (IDA*) formulation proposed by Sandholm.
      The winner-determination algorithm must be run in the context of a
real-time negotiation, and the time available to run it must be published
to suppliers as part of a request for quotations. This is because suppliers
need to know when they may expire their bids, and because shorter
bid-expiration times are expected to lead to lower prices and higher
willingness to bid on the part of suppliers. The result is that we must be
able to predict the runtime of these <math> <f> <sc>NP</sc></f>
</math>-complete algorithms based on information that can be measured or
estimated before bids are available. We report on a series of experiments
that provide us with runtime probability distributions across a range of
problem size parameters.

6/5/9   (Item 3 from file: 35)
DIALOG(R)File   35:Dissertation Abs Online
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01892842   ORDER NO: AADAA-I3054966
Approximate mechanisms and algorithms for combinatorial   auctions
   Author: Kwon, Roy Hyun
   Degree: Ph.D.
   Year: 2002
   Corporate Source/Institution: University of Pennsylvania (0175)
   Supervisors: G. Anandalingam; Lyle H. Ungar
   Source: VOLUME 63/05-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
             PAGE 2562.   158 PAGES
   Descriptors: OPERATIONS RESEARCH ; ENGINEERING, INDUSTRIAL
   Descriptor Codes: 0796; 0546
   ISBN: 0-493-70334-9

      Combinatorial   auctions are auction formats that allow agents to
submit single bids for a set of distinct items and as such economic
efficiency may be enhanced. Mechanisms for **combinatorial   auctions** may
be the basis for distributed resource allocation of multiple items with
many applications ranging from transportation procurement to
telecommunications resource allocation.
      However, with M distinct items there are
2^{M} $^{-1}$ - 1
possible bundles (set of items) and thus a bidder must face the task of
possibly evaluating an exponential number of bundles. In addition, the
auctioneer faces a non-trivial computational task in winner determination
and must solve a NP-hard problem weighted set packing.
      In the first part of the thesis I propose an extension of an
economically efficient iterative mechanism for **combinatorial   auctions**
to enable endogenous bid determination. Endogenous bidding entails
dynamically discovering new bundles through item prices so that explicit
evaluation of bundles can be avoided. A pricing **linear   program** is
developed that is unique in satisfying a normative set of properties for
item prices. The main theoretical result states that endogenous bidding is
more efficient than the equivalent problem restricted to a set of a priori
determined set of bundles under reasonable competitive environments.
      In the second part of the thesis I propose an approximation algorithm
for the winner determination problem. Real world instances of
combinatorial   auctions may involve thousands of items and thus an

inordinate number of possible bundles. Computing optimal winner determination solutions may require too much time. In real time settings e.g. the Internet time may be an important element. Thus, approximation strategies become important. I present a fast non-exact method that employs a primal-dual approximation (greedy method) for a first phase and then attempts to improve on the greedy solution by using dual information. Novel ex ante and ex post optimality bounds are derived that are non-trivial and that may offer better assessments of optimality compared to those from duality gaps or best known ex ante bounds. Empirical results indicate that the approximation strategy is effective in producing near optimal solutions in reasonable time.

Iterative combinatorial   auctions :   **Achieving economic and computational efficiency**

    A fundamental problem in building open distributed systems is to design mechanisms that compute optimal system-wide solutions despite the self-interest of individual users and computational agents. Classic game-theoretic solutions are often prohibitively expensive computationally. For example, the Generalized Vickrey Auction (GVA) is an efficient and strategy-proof solution to the combinatorial allocation problem (CAP), in which agents demand bundles of items, but every agent must reveal its value for all possible bundles and the auctioneer must solve a sequence of NP-hard optimization problems to compute the outcome.
    I propose *i*Bundle, an *iterative* **combinatorial   auction** in which agents can bid for combinations of items and adjust their bids in response to bids from other agents. *i*Bundle computes the efficient allocation in the CAP when agents follow myopic best-response bidding strategies, bidding for the bundle(s) that maximize their surplus taking the current prices as fixed. *i*Bundle solves problems without complete information revelation from agents and terminates in competitive equilibrium. Moreover, an agent can follow a myopic best-response strategy with approximate values on bundles, for example with lower- and upper-bounds.
    My approach to iterative mechanism design decomposes the problem into two parts. First, I use **linear   programming** theory to develop an efficient iterative auction under the assumption that agents will follow a myopic best-response bidding strategy. Second, I extend the approach to also compute Vickrey payments at the end of the auction. This makes myopic best-response a sequentially-rational strategy for agents in equilibrium, inheriting many of the useful game-theoretic properties of the GVA.
    *i*Bundle implements a primal-dual algorithm, COMBAUCTION, for the CAP, computing a feasible primal (the provisional allocation) and a feasible dual (the ask prices) that satisfy complementary slackness conditions. An extended auction,

<italic>i</italic>Bundle Extend&Adjust, interprets a primal-dual algorithm, V<smcap>ICK</smcap>A<smcap> UCTION</smcap>, as an iterative auction. V<smcap>ICK</smcap>A<smcap>UCTION </smcap> computes the efficient allocation and Vickrey payments with only best-response information from agents. Experimental results demonstrate that <italic> i</italic>Bundle Extend&Adjust, which keeps <italic>i</italic>Bundle open for a second phase before adjusting prices towards Vickrey payments, computes Vickrey payments across a suite of problems.

6/5/11   (Item 1 from file: 65)
DIALOG(R)File   65:Inside Conferences
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03371561   INSIDE CONFERENCE ITEM ID: CN035610698
 Integer   Programming **for** Combinatorial   Auction **Winner Determination**
  Andersson, A.; Tenhunen, M.; Ygge, F.
  CONFERENCE: Multiagent systems-International conference; 4th
  ICMAS -PROCEEDINGS-, 2000; 4TH P: 39-46
  IEEE Computer Society, 2000
  ISBN: 0769506259; 0769506267; 0769506275
  LANGUAGE: English DOCUMENT TYPE: Conference Selected papers
    CONFERENCE EDITOR(S): Werner, B.
    CONFERENCE SPONSOR: IEEE
    CONFERENCE LOCATION: Boston, MA
    CONFERENCE DATE: Jul 2000

  BRITISH LIBRARY ITEM LOCATION: 4362.048561
  NOTE:
    Also known as ICMAS 2000
  DESCRIPTORS: ICMAS; IEEE; multiagent systems

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Set      Items   Description
S1          54   AU=(FORREST J? OR FORREST, J?)
S2          68   COMBINATORIAL()AUCTION?
S3        2024   COLUMN(2N)(GENERATION OR TECHNIQUE? OR METHOD?)
S4       15472   (LINEAR OR INTEGER?)(2N)PROGRAM? OR HIGH?()DIMENSION?
S5           1   S2 AND S3
S6           9   S2 AND S4
S7           9   S5 OR S6
? show file;t 7/3,k/all
File   9:Business & Industry(R)  Jul/1994-2004/Jul 01
         (c) 2004  The Gale Group
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File  16:Gale Group PROMT(R) 1990-2004/Jul 02
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File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
File 813:PR Newswire 1987-1999/Apr 30
         (c) 1999 PR Newswire Association Inc
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Combinatorial   auctions : **A survey**

...ABSTRACT: combinations of different assets. This paper surveys the state
of knowledge about the design of **combinatorial   auctions** and presents
some new insights. (PUBLICATION ABSTRACT)
...TEXT: combinations of different assets. This paper surveys the state of
knowledge about the design of **combinatorial   auctions** and presents some
new insights. Periodic updates of portions of this survey will be posted...

... Auctions where bidders are allowed to submit bids on combinations of
items are usually called **combinatorial   auctions** . "Combinational
auctions" is more accurate, but in this survey we will comply with
convention.
Auctions...

... financial instruments; their mechanism treats financial securities as
divisible. Increases in computing power have made **combinatorial   auctions**
 more attractive to implement.

Perhaps the best known auction of heterogenous objects has been the...

...spectrum licences.

In contrast to the FCC, a number of large firms have actively embraced
 combinatorial   auctions to procure logistics services. Ledyard et al.
(2000) describe the design and use of a **combinatorial   auction** that was
employed by Sears in 1993 to select carriers. Here the objects bid upon...

...efficiently as possible. In fact, a number of logistics consulting firms
tout software to implement **combinatorial   auctions** . SAITECH-INC, for
example, offers a software product called SBIDS that allows trucking
companies to...

... Wal-Mart, and K-Mart. Two more companies have been formed to provide
software for **combinatorial   auctions** . They are CombineNet and Trade
Extensions.

Since about 1995, London Transport has been auctioning off bus routes using
a **combinatorial   auction** . About once a month, existing contracts to
service some routes expire and these are offered...

... use of an auction to allocate vacation time slots. Banks et al. (1989)
propose a **combinatorial   auction** for selecting projects on the space
shuttle. It was tested experimentally but never implemented, for...

...for 100 units; $3.95 a unit for 200 units, etc., are also examples of
 combinatorial   auctions . Here each price-quantity pair corresponds to a
bundle of homogenous goods and a bid...

... and quality guarantees, they become bundles of heterogenous objects. Davenport and Kalagnanam (2002) describe a **combinatorial auction** for such a context that is used by a large food manufacturer. Ausubel and Cramton...

...by the Osaka Securities exchange, but suspended in June of 2001.

The designer of a **combinatorial auction** faces a surfeit of choices, some of which we list below:

1. Should the collection...

... and by Sandholm (1999). To distinguish it from other possible formulations we call it the **combinatorial auction** problem (CAP). (We assume that the auctioneer is a seller and bidders are buyers.) CAP can be formulated as an **integer program**. We will survey what is known about the CAP. It assumes a knowledge of **linear programming** and familiarity with basic graph-theoretic terminology.

3.5. Exact Methods

An exact method for...

... of the constraints are moved to the objective function with a penalty term), and the **linear - programming** relaxation (where only the integrality constraints are relaxed-- the objective function remains the original function...

... huge number of columns (bids) the techniques described above need to be augmented with another **method** known as **column generation**. Introduced by Gilmore and Gomory (1961), it works by generating columns when needed rather than...

...studied have usually arisen from relaxations of SPAs. Given the above we believe that established **integer - programming** methods will prove quite successful when applied to the solution of CAP.

Logistics.com's...

... on or the number of items allowed within a package. OptiBidTM is based on an **integer - program** solver with a series of proprietary formulations and starting heuristic algorithms.

SAITECH-INC's bidding software, SBID, is also based on **integer programming**. They report being able to handle problems of similar size as OptiBid.

Exact methods for...

... by substantially pruning the search tree and introducing additional bounding heuristics. Andersson et al. use **integer programming**. In the second, the method is tested on randomly generated instances, the largest of which...

... bids examined is far smaller than the number of subsets of objects. The last uses **integer -- programming** methods on the test problems generated by the second and third.

By comparison, a straightforward implementation on a commercially available code for solving **linear integer programs** (called CPLEX) only runs

into difficulties for instances of CAP involving more than 19 items...

...a suite of test problems.

3.6. Approximate Methods

One way of dealing with hard **integer programs** is to give up on finding the optimal solution. Rather, one seeks a feasible solution...

... Before proceeding it is important to say that probably every heuristic approach for solving general **integer - programming** problems has been applied to the SPP. Unfortunately, there has not been a comparative testing ... setting auction interpretation. Dantzig (1963) specifically offers an auction interpretation for the decomposition algorithm for **linear programming** . A more recent example is Bertsekas (1991), who has proposed a collection of dual based...

... solves CAP1 (or CAP2). Such an understanding can be derived from the duality theory of **integer programs** .

4.3. **Column Generation**

Column generation is a technique for solving **linear programs** with an exceedingly large number of variables. Each variable gives rise to a column in the constraint matrix, hence the name " **column generation** ." A naive implementation of a simplex-type algorithm for **linear programming** would require recording and storing every column of the constraint matrix. However, only a small...

... of those columns would ever make it into an optimal basic feasible solution to the **linear program** . Further, of those columns not in the current basis, one only cares about the ones whose reduced cost will be of the appropriate sign. **Column generation** exploits this observation in the following way. First an optimal solution is found using a...

...find this non-basic column without listing all nonbasic columns.
Here we propose that the **column - generation** idea can be implemented in an auction setting. In the first step the auctioneer chooses...

... the basis. In effect, each bidder is being used as a subroutine to execute the **column - generation** step. In the worst case, the bidder's pricing problem might be NP-complete, but...

... the columns from the initial basis only (and possibly previously generated nonbasic columns), solves a **linear program** to find a revenue-- maximizing (possibly fractional) allocation. The new extreme-point solution generated is...

... avoid cycling, the auctioneer can always implement one of the standard anti-cycling rules for **linear programming** .

This auction procedure eliminates the need to transmit and process long lists of subsets and...

... revenue to the seller. If the bids might lead to a nonintegral allocation, then this **column generation** has to be imbedded into a branch-and-cut/price scheme to produce an integer...
... has been to point out "classical" results that apply directly to the problem of designing **combinatorial auctions** . The third has been to emphasize the connections between the duality theory of optimization

problems...

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Accepted by Ramayya Krishnan...

7/3,K/2   (Item 2 from file: 15)

Combinatorial auctions **using rule-based bids**

...ABSTRACT: of computing to create new auction forms that were previously impossible. A new type of **combinatorial auction** that accepts rule-based bids is described. Allowing bids in the form of high-level...

...DESCRIPTORS: **Integer programming** ;

7/3,K/3   (Item 3 from file: 15)

Bode Akintola02-Jul-04

02488861 232512691
A distributed scheduling methodology for a two-machine flowshop using cooperative interaction via multiple coupling agents
Jeong, In-Jae; Leon, V Jorge
Journal of Manufacturing Systems v21n2 PP: 126-139 2002
ISSN: 0278-6125 JRNL CODE: JMY
WORD COUNT: 1399

...TEXT: successfully applied to problems with different structures; namely, nonlinear continuous optimization (Jeong and Leon 2002a), **linear programming** (Jeong and Leon 2002b), and 0/1 **integer programs** (Jeong and Leon 2000). The latter application presents an implementation in the context of a...

...ed. New York: John Wiley & Sons.

Fisher, M. (1981). "The Lagrangian relaxation method for solving **integer programming** problems." Mgmt. Science (v27), pp 1-18.

Fox, M.S. and Smith, S.F. (1984...1 Journal of Production Research, in press.
Kutanoglu, E. and Wu, S.D. (1999). "On **combinatorial auction** and Lagrangian relaxation for distributed resource scheduling." HE Trans. (v3 1, n9), pp813-826.

Luh...

7/3,K/4   (Item 4 from file: 15)

02324371 110273660
Tales from a nonstandard career in operations research
Rothkopf, Michael H
INFOR v39n4 PP: 367-393 Nov 2001
ISSN: 0315-5986 JRNL CODE: IOR
WORD COUNT: 19308

...TEXT: that was new to me than with game theory itself. The other course was a **linear programming** course in the economics department of Claremont Graduate School. From it, I learned to think... into the characteristics of the solution in this case and formulated the problem as an **integer programming** problem. This did not seem useful, since there was then no way to solve **integer programming** problems. Another problem involved scheduling jobs using parallel servers. I devised a computational method for...

... was chagrined to see the results independently derived in another paper (Lawler and Moore, 1968). **Integer programming** had progressed, and the results were of more interest than I had thought.

While I...
... little later I got a paper on job shop scheduling to referee. It proposed an **integer programming** formulation that took into account several realistic factors not included in previous work. I wrote...that do not carry that risk. The FCC has now designed and scheduled its first

combinatorial   auction . Related computational issues are arising in designing auctions for electricity and e-commerce.

Bill Vickrey...

7/3,K/5   (Item 5 from file: 15)
DIALOG(R)File 15:ABI/Inform(R)
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01915156 05-66148
The efficiency of multi-unit electricity auctions
Elmaghraby, Wedad; Oren, Shmuel S
Energy Journal v20n4 PP: 89-116 1999
ISSN: 0195-6574 JRNL CODE: ENJ
WORD COUNT: 8467

...TEXT: each resource are calculated by a unit commitment algorithm which is a mixed nonlinear and **integer** optimization **program** run every period on a rolling horizon basis for the next 168 hours. The unit...auction, and examine their ability to yield efficient dispatches. These auctions can be viewed as **combinatorial   auctions** where the combinations are restricted to be one of two forms, either vertical or horizontal...INFORMS meeting, Seattle, Washington.

Isaac, R., and D. James (1998). "Robustness of the Incentive Compatible **Combinatorial   Auction** ," Maryland Auction Conference, May 29-31.

Johnson, R., Oren, S. S., Alva J. Svoboda (1997...

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Rothkopf, M., A. Pekec, and R. Harstad (1998). "Computational ly Manageable **Combinatorial   Auctions** ," Management Science 44(8): 1131-1147.

Von der Fehr, N. and D. Harbord (1993). "Spot...

7/3,K/6   (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB
(c)2004 The Gale Group. All rts. reserv.

16186612   SUPPLIER NUMBER: 107202915   (USE FORMAT 7 OR 9 FOR FULL TEXT
)
Market design and human trading behavior in electricity markets.
Olson, Mark; Rassenti, Stephen; Rigdon, Mary; Smith, Vernon
IIE Transactions, 35, 9, 833(17)
Sept, 2003
ISSN: 0740-817X   LANGUAGE: English   RECORD TYPE: Fulltext; Abstract
WORD COUNT: 9653   LINE COUNT: 00987

...   flows in the stylized network. XA (copyright Sunset Software Technology), a callable library for solving **linear** and **integer programs** , provided the horsepower to solve for the optimal (surplus maximizing) power flows ...dynamic scheduling constraints. He is the co-author of several patents in the area of **combinatorial   auction** design. He has conducted sponsored research for the FERC, the EIA, the FCC, and the...

7/3,K/7   (Item 2 from file: 148)

14843007   SUPPLIER NUMBER: 89668945   (USE FORMAT 7 OR 9 FOR FULL TEXT)
**Decision-making and cooperative interaction via coupling agents in
  organizationally distributed systems.**
Jeong, In-Jae; Leon, V. Jorge
IIE Transactions, 34, 9, 789(14)
Sept, 2002
ISSN: 0740-817X   LANGUAGE: English   RECORD TYPE: Fulltext; Abstract
WORD COUNT: 9513   LINE COUNT: 00933

...   have very different mathematical structure; i.e., these problems
can be formulated as continuous non- **linear   programs** , **linear
programs** , and **integer   programs** , respectively. The remaining of this
section will briefly discuss these applications.
     In a parameter design...as precedence relationships (Kutanoglu and
Wu, 1999). Kutanoglu and Wu (1999) proposed a price-directed **combinatorial
  auction** mechanism. In their research, they showed that Lagrangian
Relaxation with subgradient search can be viewed as a special version of
combinatorial   auction . Specifically, it is a price- directed,
non-adaptive and regular tatonnement **combinatorial   auction** . Ertogral
and Wu (2000) developed an auction algorithm to solve a production-planning
problem in...10(4), 359-387.
     Danzig, G.B. and Wolfe, P. (1961) The decomposition algorithm for
linear   programs . Econometrica, 29, 767-778.
     Davis, R. and Smith, R.G. (1983) Negotiation as a metaphor...chain.
IIE Transactions, 32, 931-940.
     Fisher, M. (1981) The Lagrangian relaxation method for solving
integer   programming problems. Management Science, 27, 1-18.
     Fox, M.S. and Smith, S. ...Computers in Industry, 37, 213-231.
     Jennergren, P. (1973) A price schedules decomposition algorithm for
linear   programming problem. Econometrica, 41(5), 965-980.
     Jeong, I.J. and Leon V.J. (2001a) A...paper, Department of
Industrial Engineering, Texas A&M University.
     Kate, A.T. (1972) Decomposition of **linear   programs** by direct
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     Kutanoglu, E. and Wu, S.D. (1999) On **combinatorial   auction** and
Lagrangian relaxation for distributed resource scheduling. IIE
Transactions, 31(9), 813-826.
     Lin, G...1996) Recovery of primal solutions when using subgradient
optimization methods to solve Lagrangian duals of **linear   programs** .
Operations Research Letters, 19, 105-113.
     Smith, S.F., Fox, M.S. and Ow, P...

 7/3,K/8   (Item 3 from file: 148)

14843004   SUPPLIER NUMBER: 89668942   (USE FORMAT 7 OR 9 FOR FULL TEXT)
**Decentralizing semiconductor capacity planning via internal market
  coordination.(Abstract)**
Karabuk, Suleyman; Wu, S. David
IIE Transactions, 34, 9, 743(17)
Sept, 2002
DOCUMENT TYPE: Abstract   ISSN: 0740-817X   LANGUAGE: English
RECORD TYPE: Fulltext; Abstract
WORD COUNT: 11864   LINE COUNT: 01024

...   Christensen, J. and Obel, B. (1978) Simulation of decentralized planning in two Danish organizations using **linear programming** decomposition. Management Science, 24(15), 1658-1667.
        Cohen, G. (1978) Optimization by decomposition and coordination...
28(6), 1372-1403.
        Dantzig, G.B. and Wolfe, P. (1961) The decomposition algorithm for **linear programs** . Econometrica, 29(4), 767-778.
        Eppen, G.D., Martin, R.K. and Schrage, L. (1989...12. Department of Industrial and Manufacturing Systems Engineering, Lehigh University.
        Kate, T. (1972) Decomposition of **linear programs** by direct distribution. Econometrica, 40(5), 883-898.
        Kouvelis, P. and Lariviere, M.A. (2000...

...internal market. Management Science, 46, 1049-1058.
        Kutanoglu, E. and Wu, S.D. (1999) On **combinatorial auction** and Lagrangian relaxation for distributed recource scheduling. IEEE Transactions, 31(9). 813-826.
        Louveaux, F...Science, 37, 1166-1181.
        Ruszczynski, A. (1989) An augmented Lagrangian decomposition method for block diagonal **linear programming** problems, Operations Research Letters, 8, 287-294.
        Ruszczynski, A. (...

7/3,K/9   (Item 4 from file: 148)

12139495   SUPPLIER NUMBER: 61207798   (USE FORMAT 7 OR 9 FOR FULL TEXT)
On combinatorial auction **and Lagrangean relaxation for distributed resource scheduling.(Statistical Data Included)**
KUTANOGLU, ERHAN; WU, S. DAVID
IIE Transactions, 31, 9, 813
Sept, 1999
DOCUMENT TYPE: Statistical Data Included   ISSN: 0740-817X
LANGUAGE: English   RECORD TYPE: Fulltext
WORD COUNT: 10155   LINE COUNT: 00883

On combinatorial auction **and Lagrangean relaxation for distributed resource scheduling.(Statistical Data Included)**
...   new method based on a distributed and locally autonomous decision structure using the notion of **combinatorial auction** . In **combinatorial auction** the bidders demand a combination of dependent objects with a single bid. We show that...

...this auction mechanism to handle complex resource scheduling problems, but there exist strong links between **combinatorial auction** and Lagrangean-based decomposition. Exploring some of these properties, we characterize **combinatorial auction** using auction protocols and payment functions. This study is a first step toward developing a...agents bid for multiple items that have inter-dependent valuations. This motivates the investigation of **combinatorial auction** in which the bidders demand a set or a combination of indivisible objects with a...

...some portions of each resource with a single bid. Rothkopf et al. (35) investigate simultaneous **combinatorial auctions** in which bidders submit bids for a combination of indivisible objects. They show that finding...

...objects (39-43). These studies show that a price equilibrium may not exist in general **combinatorial auctions** where agents demand a bundle of

interdependent items. Gul and Stacchetti (43) show that in...

...show that market clearing prices exist Wand only if the solution value of a centralized **integer program** coincide with that of its **linear programming** relaxation. This condition significantly lowers the expectation of reaching price equilibrium using any simple auction... problem. For a complete taxonomy of production scheduling problems, see Pinedo (44).

3.2. A **combinatorial auction** mechanism for scheduling

We propose a general auction mechanism for the JSP using the notion of multi-item **combinatorial auction** . The proposed mechanism is progressive or dynamic (28) since it involves some number of iterations...

...different combination of objects presents different values for the jobs as is the case in **combinatorial auctions** (35,37) . The precedence and non-preemption constraints restrict the combination of time slots that... optimal pricing" that supports optimal resource allocation. As demonstrated in the context of large-scale **linear programming** decomposition (45,46), linear subproblem objective leads to degeneracy. To relieve the problems of degeneracy...

...the iterations and the progress of the auction.

With the above discussion, we characterize the **combinatorial auction** by the following elements:

(1) Auction protocols.
* Standard Walrasian tatonnement (non-adaptive).
* Adaptive tatonnement.
(2...for distributed scheduling.

3.4. Lagrangean relaxation

We will now turn our attention to an **Integer Programming** (IP) formulation of the job shop scheduling problem with weighted tardiness objective. Although there are...the procedure ends with an infeasible solution due to the last three criteria.

3.5. **Combinatorial auction** and Lagrangean relaxation

In this section, we show that subgradient search in the context of Lagrangean relaxation can be viewed as a particular version of **combinatorial auction** introduced in Section 3.2. We focus our attention on the payment functions and the...

...We first establish a basic property connecting Lagrangean Relaxation with the regular tatonnement version of **combinatorial auction** . Using the well-known properties of Lagrangean duality we can then explore alternative payment functions...JSP. In other words, if linear resource pricing with no price discrimination is used in **combinatorial auction** (as is the case in regular tatonnement), the auction procedure does not lead to an...

...resource conflicts. As discussed in Section 2, even in the case of a large scale **linear program** (which does satisfy Strong Lagrangean Duality at optimality), there may not be resource prices supporting... r).sub.kt) where (S.sub.r) is the step size defined in (26).

The **combinatorial auction** mechanism for scheduling can be summarized as:

Step 1. Initialization: The auctioneer initializes the machine... ...two different payment functions and the two auction protocols leads to four different versions of **combinatorial auction** . In the following, we use small job shop examples to illustrate the implementation details of... 81-92.

(37.) Rassenti, S.J., Smith, V.L. and Bulfin, R.L. (1982) A **combinatorial auction** mechanism for airport time slot allocation. Bell

Journal of Economics, 13, 402-417.
     (38.) Mas...

...Hall, Englewood Cliffs, N.J.
     (45.) Jennergren, P. (1973) A price schedules decomposition algorithm
for **linear   programming** problems. Econometrica, 41(5), 965-979.
     (46.) Jose, RA., Harker, P.T. and Ungar, L...

```
Set      Items    Description
S1          37    AU=(FORREST J? OR FORREST, J?)
S2          18    COMBINATORIAL()AUCTION?
S3        8629    COLUMN(2N)(GENERATION OR TECHNIQUE? OR METHOD?)
S4        5221    (LINEAR OR INTEGER?)(2N)PROGRAM? OR HIGH?()DIMENSION?
S5           0    S2(S)S3
S6           0    S2(S)S4
S7          17    S2 AND IC=G06F?
S8           0    S1 AND S2
? show file
File 348:EUROPEAN PATENTS 1978-2004/Jun W03
         (c) 2004 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20040624,UT=20040617
         (c) 2004 WIPO/Univentio
```

DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01685670
Method and apparatus for solving concisely expressed combinatorial
     auction **problems**
**Verfahren und Vorrichtung zur Losung von klar fortmulierten Problemen einer
     kombinatorischen Auktion**
**Procede et dispositif a resoudre des problems claires d'une vente aux
     encheres combinatoire**
PATENT ASSIGNEE:
  Combinenet, Inc., (4179721), Fifteen 27th Street, Pittsburgh,
     Pennsylvania 15222, (US), (Applicant designated States: all)
INVENTOR:
  Boutilier, Craig E., 23, Brownstone Lane, Toronto, Ontario M8X 2Z6, (CA)
LEGAL REPRESENTATIVE:
  Land, Addick Adrianus Gosling et al (59332), Arnold & Siedsma, Advocaten
     en Octrooigemachtigden, Sweelinckplein 1, 2517 GK Den Haag, (NL)
PATENT (CC, No, Kind, Date): EP 1383068 A2 040121 (Basic)
                              EP 1383068 A3 040128
APPLICATION (CC, No, Date):   EP 2003077189 030711;
PRIORITY (CC, No, Date): US 395157 P 020711; US 211771 020802; US 618238
     030711
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR;
  HU; IE; IT; LI; LU; MC; NL; PT; RO; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; SI
INTERNATIONAL PATENT CLASS: **G06F-017/60**
ABSTRACT WORD COUNT: 143
NOTE:
  Figure number on first page: 2

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text Language   Update   Word Count
     CLAIMS A (English)   200404   3520
     SPEC A   (English)   200404   8906
Total word count - document A   12426
Total word count - document B   0
Total word count - documents A + B   12426

Method and apparatus for solving concisely expressed combinatorial
     auction **problems**
INTERNATIONAL PATENT CLASS: **G06F-017/60**

...ABSTRACT A3
  A method for enabling optimizing software to determine an optimal
allocation in a **combinatorial auction** includes (a) receiving a
plurality of bids each of which includes a plurality of sub...

...SPECIFICATION Field of the Invention
  The present invention relates to a method of winner determination in
combinatorial auctions .

2. Description of the Prior Art
  Combinatorial auctions have emerged as a useful tool for
determining resource allocations. Unfortunately, winner determination for
 combinatorial auctions is NP-hard and current methods have difficulty
with **combinatorial auctions** involving goods and bids beyond the
hundreds.

Combinatorial auctions are a form of auction in which a seller with multiple items for sale accepts...

...determining the winning bids/bundles, so as to maximize the seller's revenue. Applications of combinatorial auctions range from commodities trading, to resource allocation, to scheduling, to logistics planning, and the selling...

...that exhibit complementarities, e.g., broadcast spectrum rights, airport gate allocations, and the like.
     A combinatorial auction process will now be generally described with reference to Fig. 1. Assume a seller or...

...of set G of the M goods and a corresponding monetary bid V. In a combinatorial auction , the seller can receive a collection of these bids from any number of potential buyers.
     The problem of winner determination in a combinatorial auction is to find a subset of received bids where the sum of the monetary bid...

...is disjoint, and the sum of the monetary bids of the allocation is maximal.
     Most combinatorial auctions have one or more bids expressed using a simple bundle of goods associated with the...

...provide a method and apparatus for finding a high quality, even optimal, allocation in a combinatorial auction where one or more bids of the auction are in a form that concisely express...

...invention is a method for enabling optimizing software to determine an optimal allocation in a combinatorial auction . The method includes (a) receiving a plurality of bids each of which includes a plurality... plurality of bids whereupon optimizing software can determine an optimal allocation of goods in a combinatorial auction , wherein each bid includes a plurality of sub bids and each sub bid is comprised...

...the objective.

BRIEF DESCRIPTION OF THE DRAWINGS
     Fig. 1 is a diagrammatic illustration of a combinatorial auction process;
     Fig. 2 is a schematic illustration of a computer system which implements computer software...

...flow diagram of a method of determining an approximately optimal allocation of goods in a combinatorial auction ;
     Fig. 4 is a plurality of exemplary bids in accordance with the present invention;
     Fig...

...in Fig. 11(a).

DETAILED DESCRIPTION OF THE INVENTION
     The winner determination problem for a combinatorial auction is a difficult computational problem whose solution time grows exponentially with problem size. To solve...
...bids that utilize highly expressive logical operators to express the buyer's requirement in a combinatorial auction into variables and constraints that are suitable as input for conventional optimizing software. The present...

...constructed and their values determined to find a high quality, even
   optimal, allocation in a **combinatorial** **auction** where each bid of the
   auction utilizes highly expressive logical operators to express the buyer
   ...11(e).
     If Bids 1, 3 and 5 represent the only bids received in a **combinatorial**
     auction for goods g1)) - g6)), the constraints shown in Figs.
   11(a)-11(e) are the...

...CLAIMS A3
  1. A method for enabling optimizing software to determine an optimal
      allocation in a **combinatorial** **auction** , the method comprising:
    (a) receiving a plurality of bids each of which includes a plurality...

...plurality of bids whereupon optimizing software can determine an optimal
      allocation of goods in a **combinatorial** **auction** , wherein each bid
      includes a plurality of sub bids and each sub bid is comprised...

7/3,K/2   (Item 2 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01643501
Method and apparatus for forming expressive combinatorial auctions **and
    exchanges**
**Methode und Vorrichtung zur Bildung von ausdrucksvollen kombinatorischen
    Auktionen und Borsen**
**Procede et dispositif pour la formation de ventes aux encheres et de
    bourses expressives et combinatoires**
PATENT ASSIGNEE:
  Combinenet, Inc., (4179720), 311 South Craig Street, Suite 100,
    Pittsburgh, Pennsylvania 15213, (US), (Applicant designated States:
    all)
INVENTOR:
  Sanholm, Tuomas, 1 Trimont Lane, Nr. 520B, Pittsburgh, Pennsylvania 15211
    , (US)
  Suri, Subhash, 3755 Gerggory Way, Nr.5, Santa Barbara, California 93105,
    (US)
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    (US)
  Gilpin, Andrew G., 300 N. Dithridge Street, Nr. 312A, Pittsburgh,
    Pennsylvania 15213, (US)
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  Shields, Robert Lawrence Jr., 7 Crump Street, Huntington, West Virginia
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LEGAL REPRESENTATIVE:
  Land, Addick Adrianus Gosling et al (59334), Arnold & Siedsma
    Sweelinckplein 1, 2517 GK Den Haag, (NL)
PATENT (CC, No, Kind, Date): EP 1353285 A2 031015 (Basic)
APPLICATION (CC, No, Date):   EP 2003075095 030110;
PRIORITY (CC, No, Date): US 371451 P 020410; US 254241 020925
DESIGNATED STATES: AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES; FI; FR; GB; GR;
  HU; IE; IT; LI; LU; MC; NL; PT; SE; SI; SK; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO
INTERNATIONAL PATENT CLASS: **G06F-017/60**
ABSTRACT WORD COUNT: 90
NOTE:
  Figure number on first page: 4

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text   Language   Update   Word Count
        CLAIMS A   (English)   200342   1971
        SPEC A   (English)   200342   10250
Total word count - document A   12221
Total word count - document B   0
Total word count - documents A + B   12221

Method and apparatus for forming expressive combinatorial auctions **and exchanges**
INTERNATIONAL PATENT CLASS: **G06F-017/60**

 7/3,K/3   (Item 3 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
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01543225
Bidding language for combinatorial auctions **and method of use thereof**
Wettsprache zum Plazieren eines Gebots fur eine kombinatorische **Versteigerung und Verfahren dafur**
Language d'appel d'offres pour une vente aux encheres combinatoire et methode correspondante
PATENT ASSIGNEE:
  Combinenet, Inc., (4179720), 311 South Craig Street, Suite 100,
    Pittsburgh, Pennsylvania 15213, (US), (Applicant designated States:
    all)
INVENTOR:
  Boutilier, Craig E., 23, Brownstone Lane, Toronto, Ontario M8X 2Z6, (CA)
  Hoos, Holger H., 1201-1177 Pacific Boulevard, Vancouver, British Columbia
    V6Z 2R8, (CA)
LEGAL REPRESENTATIVE:
  Land, Addick Adrianus Gosling et al (59334), Arnold & Siedsma
    Sweelinckplein 1, 2517 GK Den Haag, (NL)
PATENT (CC, No, Kind, Date): EP 1286274 A2   030226 (Basic)
                              EP 1286274 A3   030319
APPLICATION (CC, No, Date):   EP 2002078167 020802;
PRIORITY (CC, No, Date): US 310001 P 010803
DESIGNATED STATES: DE; FR; GB; SE
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: **G06F-017/10**
ABSTRACT WORD COUNT: 102
NOTE:
  Figure number on first page: 3

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text   Language   Update   Word Count
        CLAIMS A   (English)   200309   1165
        SPEC A   (English)   200309   4357
Total word count - document A   5522
Total word count - document B   0
Total word count - documents A + B   5522

Bidding language for combinatorial auctions **and method of use thereof**
INTERNATIONAL PATENT CLASS: **G06F-017/10**

...ABSTRACT A3
    In a **combinatorial auction** , a plurality of bids is received each

having a plurality of sub bids and Boolean...

...SPECIFICATION Patent Application Serial Number 60/310,001, filed August 3, 2001, entitled "Bidding Languages for **Combinatorial Auctions** ".

BACKGROUND OF THE INVENTION

1. Field of the Invention
   The present invention relates to a method of winner determination in **combinatorial auctions** .

2. Description of the Prior Art
   Combinatorial auctions have emerged as a useful tool for determining resource allocations. Unfortunately, winner determination for **combi**natorial auctions is NP-hard and current methods have difficulty with **combinatorial auctions** involving goods and bids beyond the hundreds.
   Combinatorial auctions are a form of auction in which a seller with multiple items for sale accepts...

...determining the winning bids/bundles, so as to maximize the seller's revenue. Applications of **combinatorial auctions** range from commodities trading, to resource allocation, to scheduling, to logistics planning, and the selling...

...that exhibit complementarities, e.g., broadcast spectrum rights, airport gate allocations, and the like.
   A **combinatorial auction** process will now be generally described with reference to Fig. 1. Assume a seller or...

...of set G of the M goods and a corresponding monetary bid V. In a **combinatorial auction** , the seller can receive a collection of these bids from any number of potential buyers.
   The problem of winner determination in a **combinatorial auction** is to find a subset of received bids where the sum of the monetary bid...

...is disjoint, and the sum of the monetary bids of the allocation is maximal.
   Most **combinatorial auctions** have one or more bids expressed using a simple bundle of goods associated with the...

...invention to provide a method that finds a high quality, even optimal, allocation in a **combinatorial auction** where each bid of the auction utilizes logical connectives to express the buyer's requirement...
...for finding a high quality, perhaps optimal, allocation of one or more bids in a **combinatorial auction** . Generally, the method includes receiving at least one bid having a plurality of sub bids...satisfied bids.

BRIEF DESCRIPTION OF THE DRAWINGS
   Fig. 1 is a diagrammatic illustration of a **combinatorial auction** process;
   Fig. 2 is a schematic illustration of a computer system which implements computer software...

...trees shown in Fig. 5.

DETAILED DESCRIPTION OF THE INVENTION
   The winner determination problem for **combinatorial auction** is a difficult computational problem whose solution time grows exponentially

with problem size. The present...constructed and their values determined
to find a high quality, even optimal, allocation in a **combinatorial
auction** where each bid of the auction utilizes logical connectives to
express the buyer's requirement...

...CLAIMS A3
  1. A computer-implemented **combinatorial auction** method comprising:
   (a) receiving at least one bid having a plurality of sub bids with...

...implemented method for finding a high quality allocation of one or more
     bids in a **combinatorial auction**, the method comprising:
   (a) receiving two bids, with each bid including a plurality of sub...

7/3,K/4   (Item 4 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS
(c) 2004 European Patent Office. All rts. reserv.

01164891
AUTOMATIC COMBINATORIAL AUCTION **WINNER DETERMINATION**
AUTOMATISCHES KOMBINATORISCHES VERSTEIGERUNGS-GEWINNERBESTIMMUNG
DETERMINATION AUTOMATIQUE DU GAGNANT D'UNE VENTE AUX ENCHERES COMBINATOIRE
PATENT ASSIGNEE:
  Sandholm, Tuomas, (3014830), 1 Trimont Lane No. 520B, Pittsburgh, PA
     15211, (US), (Applicant designated States: all)
INVENTOR:
  Combine.Net, Inc., 311 South Craig Street, Suite 100, Pittsburgh,
     Pennsylvania 15213, (US)
LEGAL REPRESENTATIVE:
  Land, Addick Adrianus Gosling (59332), Arnold & Siedsma, Advocaten en
     Octrooigemachtigden, Sweelinckplein 1, 2517 GK Den Haag, (NL)
PATENT (CC, No, Kind, Date):   EP 1145138 A1   011017 (Basic)
                               WO 200025231   000504
APPLICATION (CC, No, Date):   EP 99971118 991025;   WO 99US23978   991025
PRIORITY (CC, No, Date): US 179659 981027
DESIGNATED STATES: DE; FR; GB; SE
INTERNATIONAL PATENT CLASS: **G06F-017/10**
NOTE:
  No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English

AUTOMATIC COMBINATORIAL AUCTION **WINNER DETERMINATION**
INTERNATIONAL PATENT CLASS: **G06F-017/10**

7/3,K/5   (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

01097745
**SYSTEM AND METHOD FOR CONSULTING AN AUCTION-BASED RANKING OF SEARCH RESULTS
     ON A COMPUTER NETWORK**
**SYSTEME ET PROCEDE DE CLASSIFICATION PAR ADJUDICATION DE RESULTATS DE
     RECHERCHE SUR RESEAU INFORMATIQUE**
Patent Applicant/Assignee:
  OVERTURE SERVICES INC, 74 N. Pasadena Avenue, 3rd Floor, Pasadena, CA
     91103, US, US (Residence), US (Nationality)
Inventor(s):
  SOULANILLE Thomas A, 931 S. El Molino Ave., Pasadena, CA 91106-4413, US,
Legal Representative:

GNOFFO Vincent J (agent), Brinks Hofer Gilson & Lione, P.O. Box 10087,
    Chicago, IL 60610, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200419171 A2-A3 20040304 (WO 0419171)
  Application: WO 2003US26258 20030821 (PCT/WO US03026258)
  Priority Application: US 2002226103 20020822
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NI NO NZ OM PG PH PL
  PT RO RU SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
  (EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT RO SE
  SI SK TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 12435

Main International Patent Class: **G06F-017/30**
Fulltext Availability:
  Detailed Description

Detailed Description
... be
  employed include sealed-bid first price auctions, open outcry auctions,
  and various forms of **combinatorial auctions** that allow bidders to
  assign bids to
  combinations of items, e.g. combinations of search...

 7/3,K/6   (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

01047134   **Image available**
AN AUTOMATED SEMI-DETERMINISTIC TRADING SYSTEM
SYSTEME COMMERCIAL AUTOMATIQUE SEMI-DETERMINISTE
Patent Applicant/Assignee:
  OM TECHNOLOGY AB, Norrlandsgatan 31, S-105 78 Stockholm, SE, SE
    (Residence), SE (Nationality)
Inventor(s):
  LYBACK David, Erik Dahlbergsg. 47, S-115 57 Stockholm, SE,
Legal Representative:
  SANDSTROM Staffan (et al) (agent), OM Technology AB, Patent Function,
    S-105 78 Stockholm, SE,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200377177 A2 20030918 (WO 0377177)
  Application: WO 2003SE287 20030221 (PCT/WO SE0300287)
  Priority Application: US 200295773 20020313
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO
  RU SC SD SE SG SK SL TJ TM TN TR TT TZ UA UG UZ VC VN YU ZA ZM ZW
  (EP) AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL PT SE SI
  SK TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English

Fulltext Word Count: 3080

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... 21 1. A typical scenario is that the orderbook is in the mode of a
  combinatorial **auction** procedure. Hence, a number of orders are
  temporarily blocked under certain conditions. The orders are...

 7/3,K/7   (Item 3 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2004 WIPO/Univentio. All rts. reserv.

01037485   **Image available**
DEMAND-INITIATED INTELLIGENT NEGOTIATION AGENTS IN A DISTRIBUTED SYSTEM
AGENTS INTELLIGENTS DE NEGOTIATION OUVERTS A DES DEMANDES SITUES DANS UN
    SYSTEME REPARTI
Patent Applicant/Inventor:
  SOLOMON Neal, P.O. Box 21297, Oakland, CA 94620, US, US (Residence), US
    (Nationality)
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200367494 A1 20030814 (WO 0367494)
  Application: WO 2001US47023 20011203 (PCT/WO US0147023)
  Priority Application: US 2000250819 20001201
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR
  KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE
  SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 46167

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... and thus determining the appropriate multi-item bundle buyer
  winner(s). The present system applies **combinatorial** **auction** processes
  to
  a unique commercial implementation of a multi-agent system.

  Dynamic INAs (d-INAs...electronic aggregation system is described in
  Halbert et
  al., U.S. patent # 6101484. A simple **combinatorial** **auction** method
  for
  determining a winner among multiple buyers for multiple items from a
  single seller...as double agents for arbitrage applications.

  Fig. 54 illustrates an intermediated method for performing a
  combinatorial **auction** (CA) between a single seller and multiple
  buyers.
  Fig. 55 illustrates a method for performing...S-C-INA), lead B-C- INA and

neutral C-INA] involved with aggregation
and **combinatorial   auctions** .

The present invention uses INAs in a distinctive demand-initiated
system in which a B...seller mode reveals a dis-aggregation function by
selling to several
buyers.

Disintermediated Multi-item **Combinatorial   Auctions** Using
INAs
In reference to Fig. 54, a traditional, intermediated, **combinatorial
 auction** is illustrated with an application to a single seller providing
items to multiple sellers. In...s) can
be more organized and efficient. Such factor filtering processes can be
applied to **combinatorial   auctions** employing INAs.

In reference to Fig. 57, factor filters operate as pruning techniques
(5815) in...for these items.

Consequently, bids must be evaluated in multiple item packages for
overlapping items. **Combinatorial   auctions** can evaluate the
competitive
bids, but information must be shared between multiple sellers in order...

7/3,K/8   (Item 4 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00969430   **Image available**
ENHANCED AUCTION MECHANISM FOR ONLINE TRANSACTIONS
MECANISME D'ENCHERES AMELIORE POUR TRANSACTIONS EN LIGNE
Patent Applicant/Assignee:
  CARIOCAS INC, 625 2nd Street, San Francisco, CA 94107, US, US (Residence)
  , US (Nationality)
Inventor(s):
  LA MURA Pierfrancesco, 440 Monroe Drive, Palo Alto, CA 94306, US,
  TENNENHOLTZ Moshe, 641 East Meadow Drive, Palo Alto, CA 94306, US,
  SHOHAM Yoav, 4058 Orme Street, Palo Alto, CA 94306, US,
Legal Representative:
  SIERRA PATENT GROUP LTD (agent), P.O. Box 6149, Stateline, NV 89449, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 2002103477 A2-A3 20021227 (WO 02103477)
  Application: WO 2002US18942 20020612 (PCT/WO US0218942)
  Priority Application: US 2001885720 20010619
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO
  RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG UZ VN YU ZA ZM ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 9532

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... again to FIG. 2, as well as FIG. 1, auction module 38 provides for
aggregated **combinatorial** **auctions** . In general, the module 38 provides
a process wherein different auctions, by different sellers, are
aggregated in order to yield a unified **combinatorial** **auction** .

According to this module 38, sellers register their goods until a
specified date (Date 1...of goods by a seller, where bids can refer to
bundles of goods (as in **combinatorial** **auctions**). In this

7/3,K/9   (Item 5 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00964488   **Image available**
SYSTEM AND METHOD FOR AN AUCTION OF MULTIPLE TYPES OF ITEMS
SYSTEME ET PROCEDE D'ENCHERES POUR DES ARTICLES DE TYPES MULTIPLES
Patent Applicant/Inventor:
  AUSUBEL Lawrence M, 2920 Garfield Terrace NW, Washington DC 20008, US, US
    (Residence), US (Nationality)
  CRAMTON Peter C, 6418 Dahlonega Road, Bethesda, MD 20816, US, US
    (Residence), US (Nationality)
  JONES Wynne P, 7 Chalfont Road, Oxford OX2 6TL, GB, GB (Residence), GB
    (Nationality)
Legal Representative:
  STANLEY B Green (et al) (agent), Connolly Bove Lodge & Hutz LLP, 1990 M
    Street, NW, Suite 800, Washington, DC 20036, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200297582 A2-A3 20021205 (WO 0297582)
  Application: WO 2002US16937 20020531 (PCT/WO US0216937)
  Priority Application: US 2001294246 20010531; US 2001898483 20010705
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ
  DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ
  LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG
  SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 17534

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... 267
  Cybernomics (2000), "An Experimental Comparison of the Simultaneous
  Multiple Round Auction and the CRA **Combinatorial** **Auction** ." Report to
  the Federal Communications Commission, downloadable at www-fcc-gov.

  Dasgupta, Partha and Eric...

7/3,K/10   (Item 6 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00908951   **Image available**
SYSTEM AND METHOD FOR A DYNAMIC AUCTION WITH PACKAGE BIDDING
**SYSTEME ET PROCEDE POUR VENTE AUX ENCHERES DYNAMIQUE AVEC SOUMISSION A
    FORFAIT**
Patent Applicant/Inventor:
  AUSUBEL Lawrence M, 2920 Garfield Terrace NW, Washington DC 20008, US, US
    (Residence), US (Nationality)
  MILGROM R Paul, 150 Lake View Avenue, Cambridge, MA 02138, US, US
    (Residence), US (Nationality)
Legal Representative:
  GREEN Stanley B (et al) (agent), Connolly Bove Lodge & Hutz, LLP, Suite
    800, 1990 M. Street, NW, Washington, DC 20036, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200242981 A1 20020530 (WO 0242981)
  Application: WO 2001US43838 20011123 (PCT/WO US0143838)
  Priority Application: US 2000252718 20001122; US 2001322649 20010912; US
    2001330672 20011026
Designated States: US
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
Publication Language: English
Filing Language: English
Fulltext Word Count: 37848

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... of Auctions and Competitive Bidding,"
  Econometrica 50: 1089
  Nisaii, Noam (1999), "Bidding and Allocation in **Combinatorial   Auctions
  ,**" working paper, http://www.es.huji.ac.il/-noam/i,iilcts itiiil.

  Palfrey, Thomas (I...

...University of Arizona.

  Rassenti, S.J., V.L. Smith, and R.L. Bulfin (1982), "A **Combinatorial
  Auction** Mechanism for
  Airport Time Slot Allocation," Bell Journal ofEconomics X111: 402
  Roth, Alvin E. and...

...Cambridge University Press.
  M. H. Rothkopf, A. Pekec and R. M. Harstad (1998), "Computationally
  Manageable
   Combinatorial   Auctions ", Management Science, Vol. 44, No. 8, 1131
  Rothkopf, Michael, Thomas Teisberg and Edward Kahn (I...

 7/3,K/11   (Item 7 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00889271   **Image available**
METHOD AND SYSTEM FOR CONDUCTING AN ADVANCED AUCTION
PROCEDE ET SYSTEME DESTINES A OPERER UNE VENTE AUX ENCHERES AMELIOREE
Patent Applicant/Assignee:
  TRADE EXTENSIONS TRADEXT AB, Kungsangsgatan 17-19, S-753 22 Uppsala, SE,

SE (Residence), SE (Nationality), (For all designated states except:
     US)
Patent Applicant/Inventor:
   ANDERSSON Arne, Rodhakevagen 3B, S-756 52 Uppsala, SE, SE (Residence), SE
      (Nationality), (Designated only for: US)
   TENHUNEN Mattias, Svartmansgatan 16, S-753 12 Uppsala, SE, SE (Residence)
      , SE (Nationality), (Designated only for: US)
   YGGE Fredrik, Linnegatan 58, S-413 08 Goteborg, SE, SE (Residence), SE
      (Nationality), (Designated only for: US)
   WURMAN Peter, 7620 Sutcliffe Drive, Raleigh, NC 27613, US, US (Residence)
      , US (Nationality), (Designated only for: US)
Legal Representative:
   AWAPATENT AB (agent), Box 11394, S-404 28 Goteborg, SE,
Patent and Priority Information (Country, Number, Date):
   Patent: WO 200223424 A1 20020321 (WO 0223424)
   Application: WO 2001SE1016 20010510 (PCT/WO SE0101016)
   Priority Application: US 2000233413 20000918
Designated States: AE AG AL AM AT AT (utility model) AU AZ BA BB BG BR BY
   BZ CA CH CN CO CR CU CZ CZ (utility model) DE DE (utility model) DK DK
   (utility model) DM DZ EE EE (utility model) ES FI FI (utility model) GB
   GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA
   MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SK (utility model)
   SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
   (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
   (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
   (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
   (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 6610

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
   Detailed Description

Detailed Description
... AB, BC, CD>
   eliminates this problem. This variant of the conventional auction is
   called a **combinatorial   auction** .

   A further variant is a multi-commodity auction with explicit discounts
   and/or additional charges...

...during the bidding is effectively described by the running price of the
   painting. With a **combinatorial   auction** , the state of the auction is
   hard to describe in a compact matter. For example...

...3 for the other item). This
   problem is discussed in "AkBA: A Progressive, Anonymous-Price
   Combinatorial   Auction ", Peter R. Wunnan and Michael P. Wellman,
   Second
   ACM Conference on Electronic Commerce, October, 2000, Minneapolis, MN,
   pages 21 - 29, and "A **combinatorial   auction** mechanism for airport
   time slot allocation", Rassenti, S. J., Smith, V. L., and Bulfin, R...

   7/3,K/12   (Item 8 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00883997

                           Bode Akintola02-Jul-04

ENHANCED AUCTION MECHANISM FOR ONLINE TRANSACTIONS
MECANISME AMELIORE DE VENTE AUX ENCHERES POUR TRANSACTIONS EN LIGNE
Patent Applicant/Assignee:
  CGTIME INC, 625 Second Street, San Francisco, CA 94107, US, US
    (Residence), US (Nationality)
Inventor(s):
  LA MURA Pierfrancesco, 440 Monroe Drive, Palo Alto, CA 94306, US,
  TENNENHOLTZ Moshe, 641 East Meadow Drive, Palo Alto, CA 94306, US,
  SHOHAM Yoav, 4058 Orme Street, Palo Alto, CA 94306, US,
Legal Representative:
  D'ALESSANDRO Kenneth (et al) (agent), Sierra Patent Group, Ltd., P.O. Box
    6149, Stateline, NV 89449, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200217187 A2 20020228 (WO 0217187)
  Application: WO 2001US25794 20010816 (PCT/WO US0125794)
  Priority Application: US 2000642078 20000818
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD
  SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 7886

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description
  Claims

Detailed Description
... again to FIG. 2, as well as FIG. 1, auction module 38 provides for
  aggregated **combinatorial   auctions** . In general, the module 38 provides
  a process wherein different auctions, by different sellers, are
  aggregated in order to yield a unified **combinatorial   auction** .
  According to this module 38, sellers register their goods until a
  specified date (Date 1...

Claim
... system of claim 1, wherein said mechanism module comprises rule
  defining programming associated with aggregated **combinatorial   auction**
  transactions, said rule defining programming configured to receive at
  least one item for sale
  from...

...said rule defining programming configured to aggregate each said item
  for sale
  into a unified **combinatorial   auction** ,
  said rule defining programn-iing configured to offer for sale items in
  said unified
  cornbinatorial...

...said rule defining programming configured to receive a bid for an item
  in said
  unified **combinatorial   auction** from a bidder,
  20
  said rule defining programming configured to receive in conjunction with
  said...

DIALOG(R)File 349:PCT FULLTEXT
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00883992
IMPROVEMENTS RELATING TO INFORMATION EXCHANGE SYSTEMS
IMPROVEMENTS RELATING TO INFORMATION EXCHANGE SYSTEMS
Patent Applicant/Assignee:
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Patent Applicant/Inventor:
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    Maharastra, IN, IN (Residence), IN (Nationality), (Designated only for:
    US)
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200217163 A2 20020228 (WO 0217163)
  Application: WO 2001IB1550 20010824 (PCT/WO IB0101550)
  Priority Application: GB 200020928 20000824; GB 200021516 20000901
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO RU
  SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 15691

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... whether he is capable of taking the allocation, which may come out of
  the auction.

  Combinatorial   auctions can also be handled by that auction engine 36.
  Suppose a Postee has a set...

...the system. For example, he might declare B1 to B4 as his assets
  available for **combinatorial   auction** .

  The system then creates the different combinations of these blocks based
  on the rules defined...

DIALOG(R)File 349:PCT FULLTEXT
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00857311   **Image available**
METHOD FOR CONDITIONAL AUCTIONS
METHODE RELATIVE A DES ENCHERES CONDITIONNELLES
Patent Applicant/Inventor:
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SE (Nationality)
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    (Nationality)
  ANDERSSON Arne, Rodhakevagen 3B, S-756 52 Uppsala, SE, SE (Residence), SE
    (Nationality)
Legal Representative:
  AWAPATENT AB (agent), Box 1394, S-404 28 Goteborg, SE,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200190985 A1 20011129 (WO 0190985)
  Application: WO 2001SE1093 20010517 (PCT/WO SE0101093)
  Priority Application: US 2000205403 20000519; US 2000648326 20000825
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU
  CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP
  KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD
  SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 8195

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... some kind.

  In some cases, such conditions may be handled using state of
  the art **combinatorial   auctions** . A **combinatorial   auction** is an
  auction in which bidders can express valuations not only on single
  items, but...

  ...these services I
  will give a 10 % discountl, is quite straightforward to express with
  todayIs **combinatorial   auctions** (as will be described below).
  However, example 2, a bid such as III am. willing...

  ...other bids having other
  conditions. This type of bid is impractical to express in present
   combinatorial   auctions , such as eAuctionHouse part of eMediator,
  presently accessible at the Internet address
  http://ecommerce.cs...

  ...the type of multi-commodity auctions of the present
  invention.

  Common to the presently available **combinatorial   auctions** for
  computer administration is that the bids, when associated with
  certain conditions, such as discount...order to exemplify the
  basic principles, as well as to make a comparison to basic
   combinatorial   auctions . The objective of this example is to
  illustrate advantages with the invention.

  The example is...

  ...C sign up for contracts 2,
  3, and 4.
  Prior art method

With a.traditional **combinatorial auction** , all combinations that each bidder could possibly accept have to be explicitly enumerated.

As seen...

...giving the corresponding integer linear formulation, but a similar result is obtained-with any conventional **combinatorial auction** winner determination algorithm.

The objective function to maximize, according to this prior art example, for...

7/3,K/15   (Item 11 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
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00809396   **Image available**
AUTOMATED EXCHANGE FOR THE EFFICIENT ASSIGNMENT OF AUDIENCE ITEMS
ECHANGE AUTOMATISE POUR L'ATTRIBUTION EFFICACE DES PRODUITS D'AUDIENCE
Patent Applicant/Assignee:
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Inventor(s):
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Legal Representative:
  BRACKETT Tim L (agent), Nixon Peabody, Suite 800, 8180 Greensboro Drive,
    McLean, VA 22102, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200143027 A1 20010614 (WO 0143027)
  Application: WO 2000US33179 20001208   (PCT/WO US0033179)
  Priority Application: US 99169973 19991210; US 2000197672 20000417; US
    2000202813 20000508
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ
  DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ
  LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG
  SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 23346

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Detailed Description

Detailed Description
... designed and experimentally tested to trade packaged combinations of
  airport takeoff and landing slots ("A **Combinatorial Auction** Mechanism
  for Airport Time Slot Allocation," Stephen J. Rassenti, Vernon L. Smith,
  and Robert L...

7/3,K/16   (Item 12 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00737987   **Image available**
GLOBALLY TIME-SYNCHRONIZED SYSTEMS, DEVICES AND METHODS
SYSTEMES GLOBALEMENT SYNCHRONISES DANS LE TEMPS
Patent Applicant/Assignee:
  REVEO INC, 85 Executive Boulevard, Elmsford, NY 10523, US, US (Residence)
    , US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
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  HAMLIN Gregory J, 33 Church Street, Presque Isle, ME 04769, US, US
    (Residence), US (Nationality), (Designated only for: US)
  FLANNERY James P, 30 Williams Street, New City, NY 10965, US, US
    (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
  PERKOWSKI Thomas J (agent), Soundview Plaza, 1266 East Main Street,
    Stamford, CT 06902, US,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200050974 A2-A3 20000831 (WO 0050974)
  Application: WO 2000US5093 20000228 (PCT/WO US0005093)
  Priority Application: US 99258573 19990226; US 2000513601 20000225
Parent Application/Grant:
  Related by Continuation to: US Not furnished (CIP)
Designated States: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK
  DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR
  LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ
  TM TR TT TZ UA UG US UZ VN YU ZA ZW
  (EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
  (OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
  (AP) GH GM KE LS MW SD SL SZ TZ UG ZW
  (EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 80968

Main International Patent Class: **G06F-017/60**
Fulltext Availability:
  Claims

Claim
... is understood that such bidders could be bidding on multiple items in
  a
  multi-item **combinatorial** **auctions** , as well as any variations thereof.
  In many applications, the bidders will be human beings...and
  subscriptions, and the like.
  Page 209 of 238
  multiple items in a multi-item **combinatorial** **auction** .
  244. The Internet-based method of claim 231, wherein one or more of said
  client...based system of claim 245, wherein said item comprises
  multiple items in a multi-item **combinatorial** **auction** .
  259. The Internet-based system of claim 245, wherein one or more of said
  client...

  7/3,K/17   (Item 13 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00561858   **Image available**
AUTOMATIC COMBINATORIAL   AUCTION **WINNER DETERMINATION**
                           Bode Akintola02-Jul-04

DETERMINATION AUTOMATIQUE DU GAGNANT D'UNE VENTE AUX ENCHERES COMBINATOIRE
Patent Applicant/Assignee:
  SANDHOLM Tuomas,
Inventor(s):
  SANDHOLM Tuomas,
Patent and Priority Information (Country, Number, Date):
  Patent: WO 200025231 A1 20000504 (WO 0025231)
  Application: WO 99US23978 19991025 (PCT/WO US9923978)
  Priority Application: US 98179659 19981027
Designated States: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK
  DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR
  LS LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM
  TR TT TZ UA UG UZ VN YU ZA ZW GH GM KE LS MW SD SL SZ TZ UG ZW AM AZ BY
  KG KZ MD RU TJ TM AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
  BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
Publication Language: English
Fulltext Word Count: 10487

AUTOMATIC COMBINATORIAL   AUCTION **WINNER DETERMINATION**
Main International Patent Class: **G06F-017/10**
Fulltext Availability:
  Detailed Description
  Claims

English Abstract
  ...structures for solution of problems of the class equivalent to optimal
  allocation determination in a **combinatorial** **auction** . The method
  stores bids in a binary tree which is searched in conjunction with a...

Detailed Description
  Automatic **combinatorial**   **auction** winner determination
  FIELD OF THE INVENTION
  The invention relates to solution of problems of the class equivalent to
  optimal allocation determination in a **combinatorial**   **auction** .

  BACKGROUND
  In sequential auctions, the items are auctioned one at a time. If an
  agent...

...is an auction protocol known as a @ 4combinatorial auction". Determining
  the winning bids in a **combinatorial**   **auction** , however, in a way that
  maximizes the auctioneer's revenue is intractable (NP-complete).

  There...

...combinations of the items. A common situation in which this is found is
  in a **combinatorial**   **auction** . In this situation an auctioneer holding
  properties wishes to maximize the value obtained through the...

...properties.
  Conventionally, practical implementations of the class of situations
  involving superadditive preferences, for example a **combinatorial**
  auction . have proven difficult because of the complexity of considering
  numerous possible combinations of bids for...

...necessity to perform the task. Conventionally, computer-implemented
  methods of selecting winning bids in a **combinatorial**   **auction** involve
  representing the items and bids in a computer or equivalent and
  performing particular operations...

...to determine winning bids. However, conventional methods are impractical for many applications.

Winner determination in **combinatorial auctions** means choosing which bids to accept so as to maximize the sum of the prices...

...time (in the number of bids placed) algorithm for finding a revenue maximizing allocation in **combinatorial auctions** – unless the complexity class NP equals the complexity class P which is extremely unlikely. Generally...it would be desirable to have a method and apparatus for optimal winner determination in **combinatorial auction** -type problems that does not require exponential time or memory; can capitalize on the fact...

...with an illustrative embodiment;
Fig. 2 depicts a method for optimal anytime winner determination in **combinatorial**
 auction -type problems in accordance with an illustrative embodiment;
Fig. 3A depicts a Bidtree data structure...

...a class of computing problems cornputationally equivalent to the problem of optimal allocation determination in **combinatorial auctions** . For example, the present invention may be applied to the weighted set packing problem where...

...More particularly, the present invention provides a method and apparatus for determining the winners in **combinatorial auctions** . The present invention may be used to find the optimal solution to a **combinatorial auction** . If a method in accordance with the present invention is terminated before it has completed...to achieve a method, apparatus, and embodied data structures for optimal anytime winner determination in **combinatorial auction** -type problems. One skilled in the art will appreciate the distinction between the manipulation of...
...to maximize revenue from an auction. These bids would be the winning bids in a **combinatorial auction** in accordance with an illustrative embodiment. The 'main search' method 270 is described in greater...

...these terms as exemplars of an application of the aspects of the invention to a **combinatorial auction** in accordance with the illustrated embodiment. From the disclosure herein, one of skill will understand...

...Bidtree data structure may be applied in other contexts of the same class as the **combinatorial auction** problem.

Now, in further detail, the Bidtree data structure 300 is a data structure configured...be defined only by the claims and equivalents thereof.

Al
APPENDIX A
VVinner determination in
 combinatorial auctions
A2
1. Introduction.
Outline
 Auction protocol design
 Review of other approaches to winner determination
 - Dynamic...

...Backtracking via leveled commitment contracts
  Breach before allocation
  Breach after allocation
  A4
  Auction protocol design...

  Combinatorial   auctions
  - Agents bids joined with OR
  - Truthful bidding can be made a dominant strategy
  via a...

Claim
... implemented method according to claim 1 wherein the sets of items are
  bids for a **combinatorial   auction** .

  3 The computer-implemented method according to claim I further comprising
  removing one or more...